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EDINBURGH MEDICAL AND SURGICAL JOURNAL:

EXHIBITING

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OF THE

LATEST AND MOST IMPORTANT DISCOVERIES

IN

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VOLUME FIFTY-EIGHTH.

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PART I.

ORIGINAL COMMUNICATIONS.

ART. I.—*Observations on Tubercular Elephantiasis as it appears in Madeira and Ceylon, and on Leprosy of the Joints as it appears in Ceylon.* By J. KINNIS, M. D., Surgeon to the Forces.

General Hospital, Fort Pitt,
Chatham, 17*th March* 1842.

SIR,—IN the beginning of October last, I was requested, by an esteemed friend, to communicate to Professor Simpson of Edinburgh any facts or observations I might have collected, in regard to the geographical distribution of leprosy, its localities, and the races most liable to it; but, having mislaid my short-hand notes on that disease, and recovered them too recently to have been able to arrange them until, as I am informed, the third and last part of the Professor's curious and learned "Antiquarian Notices of Leprosy and Leper Hospitals in Scotland and England,"[*] is in type, I beg leave to offer them, through you, to the Editor of the Edinburgh Medical and Surgical Journal, as a supplement to the "Observations on Tubercular Elephantiasis, as it appears in the Isle of France," which you did me the honour to publish, in that work, in October 1824.[†]—I have the honour to be, &c. J. KINNIS, M. D., Surgeon to the Forces.

SIR JAMES M'GRIGOR, BART.
Director-General of the Army
Medical Department.

---

[*] Edinburgh Medical and Surgical Journal for October 1841, and January and April 1842.

[†] Edin. Med. and Surg. Journal, Vol. xxii. p. 286.

I.—ON TUBERCULAR ELEPHANTIASIS AS IT APPEARS IN MADEIRA.

On my way to Ceylon, in August 1829, I obtained access to the Lazaretto of Madeira, by the obliging attention of the late Dr Heineken, and carried with me his paper on the leprosy of that Island,* to enable me to compare the actual condition of any surviving patients with his descriptions of them in 1825. Dr Heineken found in the house eleven male and seven female patients, and has described or noticed eight of the former, and two of the latter. Of these ten cases one-half had fallen victims to the disease, namely, Jozé di Mendoça, three years, Manuel Fernandes, and Manuel Rodrigues, two years, Maria di Sylva, eighteen months, and Maria d'Incarnaçoa, one year previously to my visit. Whether any of the cases, undescribed by Dr Heineken, or admitted subsequently to his visit, had also died, I neglected to inquire; but, as I found seventeen male and seven female patients, nine at least of the former, and two of the latter, had been admitted between 1825 and 1829. The following comparison will give some idea of the progress made by the disease in three cases during four years.

1. In 1825, Francisco Gonsales has the eyebrows scanty of hair, the eyelashes perfect, a little hair on the pubes, the hands healthy, the scrotum quite free from tubercles, a femoral tumour on each side, always indolent, the testicles small and pendulous, but firm and perfect, the mammæ full and indurated, and the voice rather hoarse.†

In 1829, the hair of his eyebrows is almost gone, the eyelashes are absent under a tubercle occupying the middle of the tarsal edge of each upper lid, but present at its sides and on the whole margin of the lower, the hair long and curly, but scanty in the axillæ; he has tubercles on the backs of the hands and proximal phalanges of the fingers, as also on the lower part of the scrotum; a femoral tumour consisting of three or four enlarged lymphatic glands on each side, in the usual site, and several distinct enlarged glands higher up in each groin; the left breast rather large, the right and both testicles of natural size; he is exceedingly hoarse, speaking in a whisper only, and subject to nasal hæmorrhage; he does not feel the pricking of a needle on the tubercles of the left cheek; has been four times the last twelve months attacked with fever, which continued two, three, or four days, but was not attended by pain in the femoral swellings. He is covered with papular itch, and has slight ulcerations over the whole body.

---

* Edin. Med. and Surg. Journ. for July 1826, Vol. xxvi. p. 15.

† Op. cit. xxvi. 17.

The appearances not adverted to in these comparisons are to be understood as remaining nearly in the state described by Dr Heineken.

2. In 1825, Antonio Pereira has a scanty crop of hair on the pubes, several distinct tubercles on the cheeks, the base only of the uvula remaining, the legs ulcerated, and the genitals moderately evolved. *

In 1829, he has a few hairs in each axilla; the hair of the pubes long, thin, and light-coloured; one or two brown spots, and a flat tubercle on the left cheek, but no other tubercles on either side of the face; the upper lip thick and wrinkled perpendicularly; the upper half only of the uvula remaining, rounded and thickened; the nostrils narrow and obstructed; respiration frequent and noisy; some tubercles scattered over the thighs; both legs swollen and ulcerated; the testicles hardly more than half their natural size; pulse 96, general debility. The skin of the whole body, as well as the tubercles themselves, are said by the patient to be insensible when pinched. He has febrile accessions twice or thrice a month, lasting two or three days, and attended by pain in the femoral swellings. His father, his mother, a brother and sister are living; none of them, or of his other relations, have had the disease.

3. In 1825, Antonio Rebello is hoarse, and has tubercles on the uvula and root of the tongue, with some inconsiderable ones around the elbows, an indolent tumour on each thigh, and the genitals fully evolved. †

In 1829, he has large gray whiskers, a strong beard, and the usual quantity of hair on the head and pubes, but a thin supply on the eyebrows, and one or two oblong tufts only on the eyelids; the soft palate and uvula of a deep-red, the point of the latter forming a round tubercle; the root of the tongue slightly tuberculated; the face and ears unaffected; tubercles scattered over the arms and backs of the hands, and the fingers contracted, but neither they nor the lower limbs tuberculated; a tumour, consisting of three glands, in the upper part of the right thigh, and an oblong scar on the corresponding part of the left; the right testicle soft and wasted, the left of the usual size, and the penis large. The skin of the limbs, from the elbows and knees downwards, but nowhere else, is insensible. He is attacked with fever accompanied by pain in the legs and femoral swelling about once a month. He has had no sexual desire since the death of his wife, fifteen years ago. The disease has existed twelve, and he has spent eleven years in this house. According to Dr Heineken "his mother, brother, and son were lazars." He now states that neither his father nor his mother, who are both dead, had it; but that his uncle died of the disease fifteen, his brother three years ago, and that he has a son labouring under it in the house; (Manuel Rebello, case 6).

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* Opere citato, xxvi. 18.

† Op. cit. xxvi. 19.

Of the cases which follow, no other notice than a reference to the condition of the reproductive function has been taken by Dr Heineken.

4. Antonio di Sylva, aged 42, has been affected seventeen, and in this house fifteen years. He is frightfully disfigured by the disease, having one or two hairs only on each eyebrow, near the inner extremity; two narrow tufts with an intermediate tubercle on each of the upper, and not a semblance of hair on either of the lower eyelids; numerous and elevated tubercles on the forehead and eyebrows, with thickened, tubercular, expanded and depressed cheeks, a few small tubercles on the wings, and one (which is broad, smooth, and prominent) on the bridge of the nose; a small scabbed ulcer at each angle of the mouth, and a third on the left cheek; the lips much thickened, with small imbedded tubercles; one or two immediately under the chin; a cluster weighing down the lobe of each ear, many of a minute size and reddish-white colour on the hard and soft palate, and a few imbedded in the tongue; the left tonsil is gone. The arms, fore-arms, backs of the hands and fingers, abdomen, hips, thighs, legs, and lower part of the scrotum, are tuberculated. The *glans penis* is very large, red, smooth, and shining, with an imbedded tubercle on each side near the urethra. There are scabs on the elbows and legs, a round superficial sore on the scrotum, several about the ankles, one on the second toe of the right foot, and many, superficial and either raw or scabbed, on the fingers. He has large femoral tumours, a hoarse voice, obstructed respiration, a variable appetite, the pulse of natural frequency, and is subject to febrile attacks, occurring from once a fortnight to once every two or three months, and sometimes attended by pain and increased swelling of the femoral glands. He is married and had a child, which was cut off by small-pox, born about the time the disease began, but has not cohabited with his wife since he came to the lazaretto. She and his brother, 35 years old, are free from the disease, but his father, his mother, and a sister, fell victims to it, the first seventeen, the second six, and the last (being then 25 years old) one year ago. Two of his cousins by the father's side also died of it.

5. Francisco Ferreira, aged 44, nine years affected, six years in this house. Hair of head natural, of eyebrows almost gone, of lower eyelids entirely gone, and of upper short and thin, beard absent, excepting on the sides and lowest part of the chin. There is a row of tubercles overrun by several purple, glossy, branching veins, on each eyebrow; a deep furrow at the root of the nose, many clustering tubercles on the chin, lips, and cheeks, appearing to drag the left lower eyelid obliquely downwards and outwards; tubercles on the ear-lobes and tragus, with a few under the chin, and one or two on the fore-part of the neck; tubercles thinly

scattered, small and shining, on the lower part of the breast and the whole abdomen; more thickly distributed over the flanks, arms, and fore-arms; confluent towards the wrists; large, smooth, and shining on the backs of the hands and fingers; absent on the palms; large and numerous on the hips, legs, and backs of the thighs. He has had three children, the youngest born twelve years ago, before the disease began; has cohabited with his wife since his admission, but not for the last four years; and though, as stated by Dr Heineken, she was in the family way in 1825, the child was not his. Pulse 84, appetite good. He has a cousin affected with the disease.

6. Manuel Rebello, son of Antonio Rebello, (case 3) aged 26, fifteen years affected, eleven years in this house. A small tuft only of the cilia remains near the inner end of each upper eyelid; hair very thin in the axillæ, nearly natural in quantity on the pubes. The eyebrows are bare, swollen, thickened, and separated by two deep wrinkles, with an intermediate portion of thickened skin; the nasal bones are depressed, the openings nearly closed, the wings of diminutive size, and surrounded each by a deep furrow, prolonged to the angles of the mouth. The upper lip is smooth, thickened, arched, and elongated from above downwards, the lower is thickened and hangs everted from the teeth; the nose, cheeks, and chin contain imbedded tubercles, and are overrun by purple veins; the tip of the nose appears twisted; each tragus has a tubercle; but the lobes of the ears, though thickened, flattened, shining, are not distinctly tuberculated. The palate, throat, and tongue, are studded with tubercles, several of them superficially ulcerated. The nipples are very large and surrounded by clusters of minute tubercles. The elbows are scabbed, the arms, the backs of the hands and fingers slightly tuberculated, the backs of the arms overspread with cicatrices, and the legs with ulcers and with thin greenish deciduous scabby incrustations. The femoral tumour is large on both sides, the scrotum loose and elongated, the testicles little if at all wasted, the penis rather small, the abdomen swollen, with general emaciation and debility, the inspiration noisy from the constricted state of his nostrils, the voice reduced to a hoarse whisper. He professes no knowledge of the female sex, and may be very readily believed.

These are all the cases I had leisure to examine with attention. There remained 11 male and 7 female patients, whose names I took down on first entering the Lazaretto. The only remarks attached to the former are, that two of them have breasts as large as those of a woman, and that the breasts of two others are rather large. The following short notices accompany the names of the seven females.

7. Maria Joquine, aged about 40, eight years affected, two

years three months in the house, lost an uncle by the disease, and has two daughters, the youngest, born before it appeared in herself, is eight years old and free from it, the eldest is

8. Elizabeth Joquine, aged 14, who came to the house with her, and has been seven years affected.

9. Antonia Rosa, of unknown age, affected fourteen years, thirteen in this house, never married.

10. Candira Rosa, aged 15, seven years affected, four months in the house; lost an uncle and two cousins by the disease.

11. Maria Jasus, aged 36, fourteen years affected, five in the house, never had children, and is unmarried; lost an aunt and a cousin by the disease.

12. Josepha Pereira, aged about 35, fifteen years affected, thirteen in the house. The wings and lower part of the partition of the nose, also the uvula, are destroyed. She has a tubercle on the left cornea and conjunctiva, and great hoarseness; never had children, is aunt of Joao Pereira, a male patient now in the house, but has had no other relations attacked.

13. Martina Sirba says she is 14 years old, but looks liker eight or nine, four years affected, nearly a year in the house, knows nothing of her relations.

II.—ON TUBERCULAR ELEPHANTIASIS AS IT APPEARS IN CEYLON.

In October 1834, and March and April 1836, I paid seven visits to the Lunatic and Leper hospital of Ceylon,* for the purpose of examining the cases of tubercular elephantiasis and leprosy of

---

* Of this hospital, which stands on the right bank of the Kelany river, about four miles to the north of Colombo, a rough ground-plan is annexed, Plate I. The officers and servants attached to it are; a superintendant, an overseer, a medical subassistant, two gardeners, four female cooks, and two coolies for drawing water, carrying provisions from the bazaar, &c. Every patient is allowed by Government, monthly, one parrah † of rice and four rix-dollars, or 6s. Sterling, which is expended for him in the purchase of other articles of food, his breakfast being hoppers (rice-cakes,) and coffee, his dinner and supper, curry and rice. The daily expense of one patient's rations, in addition to that of the rice-allowance, is about one fanam and a-half, or six pice, which is equivalent to 2¼d., and is appropriated thus:

For hoppers, . .	1 pice.
coffee, . .	½
jaggery, (palm-sugar,) .	¼
curry stuff, . .	½
fish or beef, . .	4
Total, .	6

For Mr T. B. Peacock's Observations on the disease in the same hospital, see Edin. Med. and Surg. Journ. Vol. liii. p. 136, for January 1840. In referring to his paper, however, it should be remarked, that my intelligent friend appears to have taken his account of "Tubercular Elephantiasis" from cases not only of that disease, properly so called, but of leprosy of the joints also.

† "The parrah is a perfect cube, its internal dimensions being every way 11.57 inches."—M'Culloch's Dictionary of Commerce, 2d edition, article Colombo.

the joints to be found in that asylum. At the first-mentioned date, the number of patients labouring under

Tubercular elephantiasis was . .	9 males and	1 female.
Leprosy of the joints, . . .	15	0
Other chronic diseases, chiefly of the bones,	8	2
Mania, ...	1	3
	—	–
Total, .	33	6

Betwixt October 1834 and March 1836, one case of tubercular elephantiasis left the hospital, and seven patients died, namely, one male and one female of the same disease, four males of leprosy of the joints, and one female of paralysis. The two who died of tubercular elephantiasis, and the one who left the hospital, were Singhalese of the Wellale caste. Both the fatal cases were accompanied by mutilation of the fingers or toes. The male was 36, the female 32 years old; the former had been nine years in the house when he died, and the latter seven.

In the same interval there were admitted under

Tubercular elephantiasis, .	8 males.	
Leprosy of the joints, .	4	
Mania, . . .	1	1 female.
	—	–
Total, .	13	1

In March and April 1836, the number labouring under

Tubercular elephantiasis was .	15 males.	
Leprosy of the joints, . .	15	
Other chronic diseases, . .	8	1 female.
Mania, ...	2	4
	—	–
Total, .	40	5

Of the 15 patients labouring under tubercular elephantiasis, 8 are* natives of Colombo or its immediate neighbourhood; 3 of Galle; 1 of Caltura; 1 of Ruanwelle; 1 of Trincomalie; and 1 of Madras; 9 are of the Wellale or agricultural caste; 2 Moors, one of Malay parentage, another the reputed son of a Malay; affected with leprosy of the joints, and the oldest patient now in hospital, by a female hospital cook of Tamul descent; and 2 the sons of Singhalese females, by an English officer the one, and a Portuguese descendant the other. Though none were born in the central highlands, five of them were residing in Kandy when the disease first appeared. In most of the others it commenced in their native places. Four of the patients have no knowledge or recollection of the diseases and causes of death of any of their relations; eight entertain the belief that none of their relations ever had the disease under which themselves labour; and of the remaining three, the reputed father of the first, as just remarked, is affected with leprosy of the joints, the second lost an aunt and a brother, and the last a maternal uncle by the disease.

---

* In analysing observations that were originally written in the Leper Hospital, with the subjects to which they apply before me, I think the *present* more appropriate than the *past* tense, and therefore employ it throughout.

The disease began in

1 patient at 10	years, and has now lasted 15,	making his present age 25
11	7,	18
15	7,	22
17	8.	25
19	12,	31
3 patients at 23	in one, 2,	25
	in another, 3,	26
	in the third, 5,	28
1 patient at 28	7,	35
2 patients at 29	in one, 8 months,	30
	in the other, 6 years,	35
1 patient at 33	7,	40
34	8,	42
35	10,	45
37	13,	50

In regard to the origin and progress of the disease, little satisfactory information can be obtained from the patients.* They generally state that the tubercles of the face were preceded, for months or for years, by one or more light-coloured insensible spots, on the hip, thigh, knee, fore-arm, or chest. Tubercles on the ears, nose, and other parts of the face, are the earliest symptoms remembered by one patient, and the femoral swelling the earliest by another. Two look upon their disease as the consequence of venereal complaints, which accidentally preceded it.

The natural colour of the different patients is a deep-reddish, a chestnut, a yellowish, or a wood-brown.† The integuments of the eye-brows, nose, cheeks, lips, chin, and ears are thickened and pervaded or studded by hard tubercles, which vary in form, number, size, elevation, distribution, and arrangement on different parts of the same, and on corresponding parts of different individuals, but are generally smooth and glossy, and of a darker colour than the sound skin. In one case the middle third of the forehead is crossed by a chain of imbedded tubercles, in another a similar chain connects the outer angle of the eye to the ear, and in one or two, a flat, slightly projecting tubercle appears on each side half-way betwixt the hairy scalp and superciliary ridge. The eye-brows are either irregularly thickened, flabby, and swollen, or converted into from one to five tubercles, overhanging the eyes, and sometimes separated from the upper lids by a deep depression. In one case their hair is in natural quantity, in four entirely wanting, in two short and scanty generally, and in most of the others absent on the outer third, irregular and thin on the two inner.

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* The observations which follow apply to fourteen only out of the fifteen cases in hospital, there being one of which I have preserved no particular account.

† See Werner's Nomenclature of Colours, by Syme.

In four cases the cilia are unimpaired, in some of unequal length and thin, and very generally wanting on the middle of the upper ciliary margin, either with or without a small tubercle on the same spot. In one such case the cilia are present on each side of the denuded part, and on the whole edge of the lower lid; in another absent in both lower lids, and in a third absent in the one, and thinly scattered over the other.

The cheeks are here a little thickened and discoloured only, there, a few small tubercles may be felt imbedded in them, and, in other cases, large oblong tubercles occupy their whole surface, running parallel to the edge of the orbit, or obliquely from the root of the nose, the outer angle of the eye and other parts, meeting, coalescing, and sending off smaller tuberculated shoots.

The lips are more or less thickened, tuberculated, everted, excoriated, and marbled by reddish-white spots, apparently the remains of cicatrized ulcers. They generally contain several imbedded tubercles of moderate size; but in one case a large tubercle occupies the greater part of each lip, and in another the upper lip encloses two, which are flat, oblong, quandrangular, and bounded by deep furrows, passing obliquely downwards and outwards from the nose on each side.

In four cases the beard is natural, in three not a pile of it can be seen, in one a few hairs remain on the middle of the upper lip and chin, and in the greater number it is deficient more or less. One only of the four cases with a natural beard has the hair of the eye-brows and eyelids unimpaired, and in one only of three cases in which the beard is wanting, is the hair of the eyebrows quite gone. The skin of the chin is either thickened generally, or bears a single tubercle on one side, or an irregular oval tubercle in the middle, or one small cluster, or two unsymmetrical clusters, with a deep groove between them.

The ears, though in most cases very remarkably disfigured, offer perhaps less variety in the form and distribution of the tubercles than any other part or appendage of the face. Their margins and lobes are irregularly thickened, elongated, and enlarged, by distinct and imbedded tubercles. In one case each ear possesses three of an oblong shape, coalescing into one, the first occupying the two lower thirds of the helix, the second and third the fore and back parts of the lobe. In another case, the helix and lobes are both tuberculated, but divided by a deep gap. There is often a degree of symmetry in the form and distribution of the tubercles on the two ears: there, as elsewhere, they are not unfrequently covered with sores or thin scabs.

The bridge of the nose is broad, rounded, smooth, and shining, with or without a tubercle on one side, and is sometimes divided, by a deep groove, from the tip and wings, which are irregularly thickened, tuberculated, expanded, and in a few overrun by large blue veins. In one case, there is a large imbedded tubercle in the tip, and two of unequal size in the wings, all three in contact, and all three ulcerated; in another, an irregular cluster of confluent tubercles encircles the same parts; here, a small oblong dark tubercle rests on the lower part of each wing; there, a single tubercle, doubled upon itself, embraces and fills up the whole of one nostril; in this patient, the tip is smooth, globular, and enlarged to the size of a hazel-nut; in that, it is attenuated and pointed, with a smooth ulcer on its left side. The nostrils are, in some cases, dilated, in others, contracted, linear, excoriated, ulcerated, or blocked up with inspissated mucus and purulent matter, or dry hardened blood; the partitions between them thickened, tuberculated, ulcerated, perforated, or destroyed. The breathing is obstructed and noisy; the voice nasal, hoarse, and whispering; most of the patients are subject to nasal hæmorrhage, periodical in some, brought on by occasional causes in others, as blowing the nose, exposure to the sun, &c.

The gums of one patient are red, swollen, soft, and tender; another has lost all his teeth, excepting one of the upper and three of the lower jaw, but this may be due to old age; in a third, are several small tubercles on each side of the tongue, near the root; in a fourth, its natural papillæ are merely enlarged; and, in a fifth, there is no appearance of papillæ, the whole tongue being smooth, glistening, and whitish.

The palate is either unaffected, or it is of a yellowish colour, with a diffused red patch in the middle; or has a longitudinal, central, tuberculated line; or an oblong, white, triangular, tuberculated patch on its fore-part; or the soft palate is roughened by small, irregular eminences; or there is an orange-coloured tubercle on its left posterior arch. The uvula has a tubercle in front in one, is elongated and pointed in another, and shortened in several cases. A few distinct tubercles are observed in one case, on the posterior surface of the pharynx. The tonsils present nothing remarkable. The tubercles of the palate and uvula are quite sensible when pricked with a pin.

Under the left angle of the jaw there is, in one case, an irregular glandular swelling, adhering to the skin, and superficially ulcerated; in no other are the skin or lymphatic glands of the neck affected. The fore-part and sides of the chest and abdomen, the insides of the arms and thighs, and the flexures of the shoulder, elbow, hip, and knee-joints, exhibit, in most of the cases, no other change than an eruption of itch, or numerous small and superficial scars, left by former attacks of that disease. Neither tubercles nor tubercular thickening of the skin is observed on the chest of a single patient; nor on the abdomen, excepting in two cases. In one of these, there is a small, solitary, smooth, shining, slightly elevated, imbedded tubercle, three inches above, and a little to the right of the umbilicus; and, in the other, between this last part and the ensiform cartilage, four reddish-brown, transverse, minutely tuberculated bands, one inch in breadth, alternating with four others, possessing the same tuberculated character, but of a wood-brown colour, and only a quarter of an inch broad, the whole forming a rough striped partial girth, equal in length to about one-fourth the circumference of the abdomen.

On the back, loins, shoulders, hips, and outside of the arms and thighs, the lozenge-shaped divisions, natural to the surface of the skin, are greatly augmented in size, and the lines circumscribing them are either unusually deep and broad, or elevated into ridges of doubled cuticle, which convert the lozenges into superficial cells, some of them so large as an inch in length, and one-fourth of an inch in breadth. There are tubercles on the backs of two patients only, neither of them the same, in whom the abdomen is affected. A thick patch of skin on the right interscapular region of the one contains a large cluster of tubercles, the tips of half a dozen of which are visible; and, betwixt the lower angles of the scapulæ and the crests of the ilia, as well as over the sacrum and in the hips, numerous tubercles may be felt imbedded, and seen slightly elevated. In the other patient, the skin interposed betwixt the spinal fossa, the lower angle of the right scapula, and the crest of the ilium, is pervaded by tubercles, many of which may be felt congregated into ridges, running from the spine obliquely forwards and downwards: the skin of the left loin is considerably thickened, but has few or no imbedded tubercles.

The scrotum is tuberculated, chiefly in its most depending part, in five cases, and in one of them, the penis is studded with large tubercles. They are attended with irregular thickening and ulceration; in one case, there is considerable thickening, without any distinct tubercles; and, in another, where the scrotum is unaffected, a small tubercle can be felt in the prepuce, which is in a state of permanent phymosis by former ulceration.

Tubercles exist on the inner and fore-part of the upper extremities in two cases only, there being a flat, imbedded tubercle in the right arm of the one, and a number of smaller size in the forearms of both. They are much more common on the outer and back parts; but, generally even there, more readily, to be felt than seen, excepting on the elbows and fingers, where they are equally manifest to the sight and touch. One patient has an elevated tubercle, one inch by half an inch in diameter, and consisting of three distinct lobes, on the back of the right elbow, while the skin covering the left is merely flaccid and swollen; another has five or six on the left elbow, and none on any other part of the arms; and a third has a small tubercle on each. In others, again, we remark four large distinct tubercles, or one cluster on each elbow, or one tubercle on the right, and a cluster on the left; the only thing common to the whole being a pale flesh-red colour from the destruction of the *rete mucosum* by former ulceration, and, on the surface of one or more, the actual existence of this process, in a chronic form.

The hands are dry, wrinkled, smooth, shining, thickened, tuberculated, ulcerated, contracted or mutilated. The backs of the fingers are the ordinary seat of the tubercles, though in one or two cases they are observed on their palmar surface, or on the backs of the hands. One patient has them on all the fingers, another on all of one hand, a third on two of the fingers, and a fourth on the proximal phalanges and between the knuckles only. In the case last referred to the left proximal phalanges are shortened, the middle bent upon them, and the distal upon the middle, forming three sides of a parallelogram, which may be extended to a straight line mechanically, but not by volition; several of the tubercles are ulcerated, and the nails are short, broken, irregular, or elevated into ridges, with sloping sides; or changed into a thin, yielding, elastic membrane, like a bit of parchment. In another the distal phalanx of the right little finger is lost, and the stump cicatrized without a nail; there is a small distinct tubercle on every proximal phalanx, that of the thumb excepted, and one betwixt the fore and middle finger, two of them and the distal phalanx of the fore-finger in a state of ulceration: the left fingers are contracted into zigzag lines, or their phalanges form three right angles, two opening on the palmar and one on the dorsal aspect of the hand; none of the joints appear to be ankylosed, but he has lost the power of straightening them; there is one tubercle on the back of the proximal, and three on the front of the distal phalanx of the thumb, one of the last is ulcerated; there are also one or two sores on the proximal joints, and one on the wrist. A third patient has lost one of the phalanges of every finger, and the greater part of the distal phalanx of the thumb of the right hand, together with one of the phalanges of the left little finger; flesh-coloured scars on the backs of the fingers indicate the points through which the bones escaped, and fragments of irregularly broken, twisted, thickened, horn-like, black or amber-coloured nails, remain attached to all the stumps. The fragment on the right middle stump, and the nail of the left fore-finger are undermined and nearly detached by ulcers; the hands and fingers have the usual dry, shrivelled appearance, but no distinct tubercles, though these are observed in small number on other parts of the limbs, the face and scrotum. The two last are the only examples of mutilation of the fingers among the fourteen cases of tubercular elephantiasis under examination. In one of them the toes also are mutilated, and three patients in whom all the fingers are complete have lost one or more of the phalanges of the toes.

Tubercles are to be seen or felt rarely on the hips, oftener on the outer parts of the thighs, very generally in clusters, with one or more of them superficially ulcerated, on the knee-joints. One patient's patella is occupied by three distinct tubercles of a lurid red colour, the largest measuring two and a-half inches by one inch, and the others one inch each in diameter, with several of a smaller size interposed between them.

The ankles and feet are sometimes swollen and tense, sometimes beset with tubercles on their fore and upper parts, the cuticle covering them being dry, cracked, in progress of desquamation, partially ulcerated, or scabbed. In one case the leg, from the knee downwards, exhibits the characters of *Bucnemia tropica*, and is the only example I remember to have seen of that disease combined with tubercular elephantiasis. Clean, superficial ulcers and abraded tubercles discharging a little turbid bloody serum, are sometimes observed on the soles of the feet.

The toes are in several swollen at their tips, ulcerated, and shortened, even when the patients are unaware that any portion of bone has been lost. In the case already noticed of mutilation of the distal phalanx of the right little-finger, neither of the little toes reaches farther than the root of the fourth, the left has no nail, two others have a small splinter each, and the great and fourth are the only toes of this foot with entire nails; while the great toe alone of the right foot retains the nail, which, too, is on the point of separation by an ulcer burrowing under it.

The patient, whose fingers have lost so many joints, is deprived in addition of two phalanges from every toe, and probably of one or more of the metatarsal bones of the left foot, which is shortened and contracted, with a large flesh-coloured scar above the outer ankle, and two deep conical ulcers on the sole behind the great and fourth toes; these two retain fragments only of nails. The bones of the right foot are complete, but all the nails have been shed excepting a small undermined portion of that of the great toe. Beneath this toe, and on the upper surface of the same foot, are two superficial ulcers.

In three cases, in which the fingers are entire, one or more of the phalanges of the toes have disappeared. In one the second and third right toes are reduced to stumps of half-an inch long, with nothing corresponding to nails, and each is reported to have lost two bones; the fourth toe is short, slender, and has no nail; the great toe is of the usual size, with a perfect nail; and the left toe-nails are imperfect, thickened, and broken. The next patient has lost, from the right foot, the bones of the middle phalanx of the fourth and the distal phalanx of the little toe; the latter carried the soft parts and the nail with it; the former, escaping by the under surface, left the distal phalanx with the nail remaining. The nails of all the other toes are short, irregular, and broken. In the third patient, who has lost the left little toe, with two phalanges of the third and two of the fourth, the bones passed out by the upper surface; the nail of the great toe appears natural; the nail of the second, whose distal is bent inwards and downwards to a right angle with the middle phalanx, is very imperfect, while the three outer toes have no nails at all; the right great toe has an ulcer on its under surface, and another beneath its nail, which is thickened and irregular.

The femoral swelling is found in every case, generally on both sides, sometimes larger on the one than the other, about two inches below and parallel to the groin, amounting to a slight fulness only in one patient, conspicuous and large in all the rest, of an oval form, attaining sometimes the size of four by two and a-half inches, and consisting of two or more enlarged lymphatic glands. In one case, on the right side, it has a cicatrized surface, with seven or eight ulcerated points, surrounded by elevated, red, undermined skin, and, in the groin itself, there is an oblong continuous ridge, ulcerated at its outer extremity. About one-half of the patients are subject to periodical attacks of fever, attended by pain in the femoral swelling, and in the tubercles and sores of the lower limbs, lasting two or three days, occurring once a-week, once a fortnight, or at more distant and uncertain periods, and sometimes ascribed to unusual exertion or fatigue; periodical fever, without pain or swelling of the tubercles, ulcers or glands, is also reported sometimes to occur.

In seven out of twelve patients, regarding whom only specific memoranda on this point have been preserved, both testicles are of their natural size; in two the right is rather small and the left natural, and in three both are rather small. Two of the last assert that they have never had sexual intercourse, and the third that he has not known his wife, nor experienced desire since the disease began, though he has a daughter eight and a son seven years old, previously born. One of the two, whose right testicle is rather small, says that his sexual propensities are diminished, but that he indulged them about a year ago. One who has laboured under the disease seven years, states that he had venereal intercourse five and two and a-half years ago, but has had no desire since the tubercles appeared on his face; another, in whom it has existed six years, affirms that, during the first two of the last five years, he cohabited with his wife, but not once during the three that have intervened since; a third, whose wife died before the disease appeared, alleges that he has remained continent ever since, agreeably to her death-bed injunction, and has had no impulse to disobey it; one, in whom the disease has existed seven years, says he cohabited with a woman three years ago; and most of the others deny that they have had sexual desire, if not from the commencement of the disease, at least since their admission into this hospital.

One or both of the nipples are, in most cases, round, smooth, and of a pale-red colour from previous ulceration, caused by the employment of friction and pressure, to allay a very troublesome sense of heat and itching, which commonly resides in these parts. In one patient the nipples are large and elongated; in another, the right is very large, prominent, smooth, shining, and painful on pressure, its diameter being one and a quarter, and elevation three-quarters of an inch, while the left is natural in appearance and size; in a third, a gland-like body, firm, hard, and about two and a-half inches in diameter, may be felt under each nipple, which is itself enlarged to the diameter of half-an-inch, smooth, shining, hemispherical, and, as in several other cases, encircled by a black areola.

The average frequency of the pulse, in the sitting posture, is from 100 to 110 a minute, and it is weak, in correspondence with the emaciation and debility of the patient, which are always considerable, and sometimes very great: the least frequent pulse is 88; it is under 100 in four, and not higher than 124 in any case. The skin is generally dry, but the appetite good, in the absence of the febrile accessions, though sometimes capricious and variable. The sleep is often disturbed and interrupted by pains in the shoulders, back, and limbs, and by a distressing sense of heat and itching over the whole body, which, if not entirely caused, is doubtless, in many cases, aggravated by the co-existence of scabies. The sensibility is greatly impaired, and, in some cases, nearly destroyed, not in the tubercles only, but in the whole skin of the upper and lower limbs below the elbow and knee-joints. With general numbness, where tubercles exist, one patient feels the point of a needle or pin penetrating any tubercle selected for the experiment on the face; another feels this pricking in the eyebrows, but in neither the lobe of the left ear, nor the tuberculated skin, on the outside of the arms and legs; and, in a third, whose general sensibility seems to be very obtuse, untuberculated parts, as well as tubercles themselves, are sensible in some regions, and insensible in others. One patient only reports the sensibility of the whole skin to be unimpaired.

III.—EXAMPLES OF TUBERCULAR ELEPHANTIASIS IN DIFFERENT RACES INHABITING CEYLON AND THE MAURITIUS.

CASE I. of five months' duration, Sheva Touma, aged 48, a Moor, a widow, a native of Trincomalie.

Trincomalie, 24th November 1834. She is of a light-brown complexion, with dark eyes and black hair, which begins to be whitened by age, and is in natural quantity on the scalp, eyebrows and eyelids, but short in the axillæ. The face, ears, hands, arms, shoulders, right side of the back, and both hips, are studded with slightly elevated tubercles, of a light reddish colour, and from a line to half an inch in diameter. On the face they are of a dark bluish tint, quite sensible to pressure, attended by a very troublesome itching, some ulcerated, some covered by depressed brownish scabs. The eyebrows are rendered irregular, the nose widened, the upper lip enlarged, the back of the right and the margins of both ears studded by tubercles. There is one cluster on the left shoulder, one on the arm, one on the elbow, and a few distinct tubercles on the front and back part of the forearm. Tubercular thickening of the skin, or distinct imbedded tubercles, are found on the palms as well as backs of the fingers, and one or two on the backs of the hands. On the right shoulder, arm, and elbow, are the same number of clusters as on the left; some have been and others are now ulcerated. By account, she has no femoral swelling, but is subject to attacks of fever, having had three, of six days' duration each, since January last. Has been a widow ten years, and had five children, who are all dead.

CASE II. of eight months duration, Abdoolla, aged 30, of Malay parents, born in Colombo.

Leper Hospital, 7th April 1836. The hair of the eyebrows, eyelids, beard, and pubes is in natural quantity; the skin of the eyebrows, cheeks, and ears thickened; the ears studded with tubercles; the cheeks of a darker colour than other parts of the face; the bridge of the nose broad, and the point full and shining, with no perceptible demarcation from the wings, which are slightly tuberculated on their lower margin: the nostrils are large and round, their partition ulcerated and tender, he has a nasal voice, and is subject to nasal hæmorrhage; there are a few small imbedded tubercles in the lips. The skin of the neck, trunk, and limbs is natural, with the exception of that covering the two lower thirds of the tibiæ, which is thickened and benumbed. Has a very slight fulness below each groin. The testicles are of natural size; but he has had no sexual desire since the disease began eight months ago. His father was a serjeant in the Ceylon Rifle Regiment; himself went to Singapore in 1824, and there enlisted into the same corps in 1832. He was discharged the service, on account of his present complaint, on the 8th ultimo, the day of his admission into this hospital.

CASE III. of two years and a-half duration, Louise Moreau, aged about 50, born in the Mauritius,* her father being French, her mother a native of Madagascar.

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* The cases that occurred in the Mauritius have been referred to in my observations

Pamplemousse, Mauritius, January 1823. She is of a light copper colour, with dark eyes, hair formerly black, now gray, in natural quantity on the head, axillæ and pubes, rather thin on the eyebrows and lids; skin in general soft, but dry and wrinkled. With exception of some very slightly raised tubercles on the arms, and discolorations on the breast, the disease is confined to the face, ears, and hands. The tubercles vary, from the size of a split-pea to that of half a large filbert, and none of them rise more than two lines above their base; they are of the same colour as the sound skin, but of a deeper shade, hard, glossy, and movable over the subjacent parts; few and depressed on the forehead and eyebrows; more numerous and more elevated on the cheeks; largest of all and confluent on the nose and chin; considerably enlarging the right ear-lobe, while the left ear-lobe, the lips, the cavity of the mouth, the voice, and respiration are natural. She has been subject to nasal hæmorrhage for twelve months, occurring generally on stooping, and complains that her face swells in the morning, when she is employed in cooking breakfast, but goes down in the course of the day. The palms are wrinkled and spotted; the backs of the hands thickened and tuberculated; the tubercles on the fingers being large and oblong; the feet and ankles slightly œdematous, and, as well as the hands, benumbed, while some tubercles are altogether insensible. There is no femoral swelling, and the genitals and breasts appear natural. She has cohabited with a creole eight or nine years, and enjoyed good health until she ceased to menstruate, two years and a-half ago, when the disease began, first in the hands, then in the face. Though she has seldom since experienced her former sexual propensities, she yet states that she was pregnant, for the first and only time, and miscarried, about a year ago, at four months. Appetite good; pulse 112, but she appears agitated from an apprehension that my visit is official, and that she may be sent off the island. Her father was a Frenchman, her mother a Malgashe; she does not know of what disease the latter died, having been then young, but she has a brother and sister in good health.

CASE IV. of four years' duration, Hendrique Correa, a cooper by trade, aged 28, born at Galle, his father being a Portuguese descendant, his mother a Singhalese.

Leper Hospital, 28th March 1836. The disease began five years ago, in the form of a white insensible patch on each thigh, which lasted five months, and was succeeded by tubercles, first on the cheeks. He was admitted from Galle, 2d May 1835. His hair is black and copious, on the head, beard, and pubes, and thin on the outer third of the eyebrows, which, with the interposed skin, are thickened, but not tuberculated. In the cheeks are several flat, imbedded, coalescing tubercles; the tip of the nose forms a crescent with the right wing, and is separated from the left by a depression, the whole forming a mass of small congregated tubercles, which preponderate on the right side. The lips are ulcerated or scabbed,

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on the disease, as it appears in that island, in the Edinburgh Medical and Surgical Journal, Vol. xxii. p. 286.

swollen, tuberculated, protuberant, apart, and the lower everted, with two clusters of unsymmetrical tubercles, divided by a groove, on the chin. The helices of the ears are thickened and enlarged by numerous small tubercles, a few superficially ulcerated, and the lobes elongated, by a large oval tubercle in each. The gums are swollen and tender ; the forepart of the palate, and an interrupted line in its centre, tuberculated. Has a nasal voice, and is subject to frequent nasal hæmorrhage. His nipples are of the size of cherries, red from ulceration, which is now confined to their centres, and itch much. Betwixt the right scapula and spinal fossa there is a patch of thickened skin, containing a large cluster of tubercles, the tips of half a dozen of which may be seen above its level, though differing very little in colour from the sound part. From the lower angles of the scapulæ to the crests of the ilia, nearly the whole of the skin on both sides, and on the sacrum, is in the same thickened state, and here numerous tubercles may be felt imbedded, or seen slightly elevated. The outer and foreparts of the arms, and outer and backparts of the forearms, are thickened and tuberculated, more especially about the elbow-joints, where they have been ulcerated, and are now scabbed. There are two or three tubercles on the back of the right hand, and one on the back of the proximal joint of the right little finger ; but none on any of the other fingers, and the nails look healthy. He has phymosis and a small tubercle at the end of the prepuce ; a large oblong swelling beneath each groin ; a few tubercles in the thickened skin of the thighs, and a cluster on each knee. The legs and feet are tense, swollen, cracked, and superficially scabbed. The toe nails are broken and deformed, and there are several sores about the toes, but none of their phalanges are lost. Pulse 98 ; tongue pale ; appetite indifferent ; bowels regular. The femoral swellings have existed from the commencement of the disease, which was preceded by venereal complaints, though he has had no sexual intercourse or desire since, and are sometimes larger than at present, but never painful ; nor is he subject to febrile attacks. His mother, a Singhalese, died of another disease ; his father, a Portuguese descendant, and three sisters, are alive and well ; and he never heard that any of his relations were similarly affected.

CASE V. of six years duration, Ollisa, aged 35, a Moor, a boatman, born at Caracal on the Madras coast.

Leper Hospital, 31st March 1836. The helices and lobes of the ears are increased in thickness and breadth, by confluent imbedded tubercles, which are glossy and shining posteriorly, but roughened in front, by desquamating cuticle, superficial sores, and thin scabs. In the centre of the upper lip, there is a hard shining tubercle; the wings of the nose feel hard and thickened; the cheeks are not affected ; the eyebrows are thickened, and scantily supplied with hair, particularly on their outer third ; the cilia are thin, and the beard, as well as the hair of the head, is diminished in quantity. The nostrils are tender ; their partition ulcerated on both sides ; he has nasal hæmorrhage every night, and pieces of dried blood are generally detached from the nostrils, when he washes his face in the morning; uvula rather short; voice nasal, not hoarse; inspiration noisy. His whole trunk is covered by the scars of itch; hands smooth and shrivelled; several sores on the thumbs and fingers. The nails of the left ring and little fingers are irregularly broken and thickened, and the nail of the right little finger twisted and fluted. The nipples are smooth, but not enlarged. There is a diffused swelling below each groin. All the toes of the right foot are swollen at their points, and superficially ulcerated; the nails are short, thickened, irregular, and detached from the subjacent parts. Below the knees and elbows, the sensibility is almost gone, and above very blunt. There are several sores covered with thickened cuticle on the soles of both feet, and the nails of the left toes are broken, short, thickened, and irregular. The testicles are of their natural size. He has been twice married; his first wife died about the time the disease began, six years ago; he has ceased to cohabit with his second wife for three years, from loss of power; has pain in walking in the calves of the legs, and is subject to pain in the sores of the feet, and femoral swellings, sometimes accompanied by fever. He sleeps ill, until towards morning, from pain in the limbs and sensation of heat. Pulse 112, and weak; appetite good. He is not aware that any of his relations ever had the disease, which attacked him in Colombo.

The death of this patient was announced to me on the 22d May 1837, and I inspected his body twelve hours and a-half after death. It was greatly emaciated; a few drachms of serous fluid were found in the chest, to which the inferior lobe of the right lung adhered by several loose cellular bands. In this lobe was found an abscess, the size of a goose's egg, with several others of a small size; and it, as well as the upper lobe of the lung, was hepatized, and of a red colour. A considerable quantity of frothy fluid was found in the trachea and bronchi. The omentum contained no fat; the small intestines a few round worms; the abdominal viscera appeared otherwise healthy. Two sores on the sole of the left foot led to a very extensive sinus, overspreading the inner ankle, and following the long flexor of the great toe more than half-way up the leg. The tendon of this muscle hung out from one of the sores in the sole. He had lost none of the joints.

Case VI. of six years' duration, Augustin Labiche, aged 12½, a Creole of French descent, born in the Mauritius.

Mauritius, January 1823. He is a lively intelligent boy, of a pale, very slightly tawny, white complexion, the eyes blue, hair brownish-yellow, in natural quantity on the head, entirely absent on the eyebrows and lower eyelids, thin and short on the upper. None has yet appeared in the axillæ or on the pubes. There are tubercles on the face, ears, and extremities, generally oblong, smooth, shining, slightly elevated, of a light bluish copper colour, distinct or confluent; the longest above an inch, by half-an-inch in diameter. A few of a small size, low and pale, are scattered over the forehead; one of the largest size rests on the outer end of each eyebrow; one very large and prominent on the point of the nose; one, smaller and globular, on each wing; several small and distinct surround the lips. On the cheeks and chin, the tubercles are paler, bluer, less elevated, and more confluent than elsewhere; there are two or three on the lobes of each ear, and one, the size of a garden pea, shining and red, from which he feels no inconvenience, in the back of the throat. The elbows are harsh, discoloured, and tuberculated; there are flat pale tubercles on each shoulder, increasing in distinctness and elevation down the back of the arms to the hands, on which several may be felt about half an-inch in diameter, but hardly any can be seen, their colour being the same as that of the unaffected skin. On the hips there is a general efflorescence of a reddish blue colour, hardly at all elevated, here and there interspersed with tubercles, which are most numerous near the margin and down the limb; become fewer and distinct, though still very flat, in their descent; nearly disappear a few inches above and below the hams, but are continued on the outside from the level of the pubes to the ankles; of a reddish colour and confluent, on the knees and fore part of the thighs, more scattered and less elevated on their inside and on the legs. The knees and feet are smooth, dry, harsh, and shining, with very few distinct tubercles on the latter. There are two cicatrices in the left groin, and two or three lower down, on the fore part of the thigh. There is also a diffused femoral swelling on each side. The cicatrices are the consequence of abscesses, which began above nine months ago, burst spontaneously, and discharged matter for three months before they healed. Previously to their appearance, he had occasional swelling and pain in one of the glands under each groin, but not since. Pulse 80, of natural strength; tongue clean; appetite good. The disease began six years ago, and attacked the arms before appearing on the face and other parts. He had been successfully vaccinated a short time before. His father is dead. His mother and three other children, the eldest 15, the youngest 11, are before me in good health. Two maternal aunts, and two cousins of his mother had the disease. His mother's grandparents were Europeans.

CASE VII. of seven years' duration, David Appoo, aged 35, a Singhalese of the Wellale caste, born in Colombo.

Leper Hospital, 24th March 1836. The disease began seven years ago, in Colombo, in the form of white spots, under the armpits, under the nipples, and on the elbows; these disappeared, leaving no vestige behind, and were followed in about a year by tubercles, first of the face, then of the ears, then of the limbs. Admitted into this hospital 9th June 1833. He is of a reddish brown complexion; skin dry, shrivelled, glistening, its lozenge-shaped divisions large and conspicuous, perspiration scanty and partial. The eyebrows are bare and overhang the lids, with a deep angle between them. The left upper lid has a small tubercle near the inner end of its margin, and is loose and thickened; the right lower and the middle third of both upper lids are destitute of cilia, which in other parts are thin and of unequal length. On the right cheek an oblong transverse tubercle, half-an inch below the orbit, joins another passing from the root of the nose to the commissure of the lips;

several tubercles coalesce in a somewhat similar way on the left side. The nose is thickened, and bears three large contiguous tubercles on the point and wings, the right descending a little lower than the left; there are superficial ulcers on these, and also on the internal surface of the nose; his voice is nasal and slightly hoarse; he had often nasal hæmorrhage soon after the disease began, but seldom has now; the soft palate is roughened by eminences smaller than a split-pea; the lips are filled with imbedded tubercles, the lower everted, with a light coloured patch, apparently from previous ulceration on it, both angles excoriated, and the right below the level of the left; no distinct tubercles on the chin, which feels thin and flabby. The whole margin of the helices and lobes of the ears are thickened and tuberculated. Under the left angle of the jaw there is an irregular glandular swelling adhering to the skin, and ulcerated. Around the right nipple there is a diffused swelling, under which may be felt a firm, flat, gland-like body, an inch and a-half in diameter; both nipples are enlarged, and the right flesh-coloured. There is a distinct, flat, imbedded tubercle, on the inside of the right arm, and several of a smaller size on the inside of the fore-arm; on the outside of both arms the skin is harsh, dry, shining, gathered up into ridges, and studded with imbedded tubercles; on each elbow are four of a large size, most of them ulcerated or cicatrized. The backs and outsides of the forearms are also studded with tubercles; hands dry and shrivelled; the nail of the right ring finger resembles a bit of thin parchment; the other nails are irregularly broken, and either deficient to within a line of their roots, or fluted, or elevated into central ridges, sloping to their sides; all have been, and the thumb, middle, and little fingers now are ulcerated in different parts; of the left fingers all the phalanges are bent to right angles with each other, and may be extended mechanically but not by volition; their backs are covered by sores, and by large smooth flesh-coloured scars; their nails irregularly bent and broken, the skin of the palms harsh, dry, and adherent to the parts beneath. About three inches above and a little to the right of the umbilicus, there is a smooth, shining, slightly raised, imbedded tubercle, an inch by half-an inch in diameter. The skin of the hips, and of the back and outside of the thighs, is dry, shining, thickened, adherent, and pervaded by tubercles, some of them near the knees of a large size. The knees have each a cluster of from four to six, several of them ulcerated. The legs are swollen, dry, shining, and subdivided into numerous compartments, by the cracking of the overstretched cuticle, which desquamates from the cracks. The forepart of the left tibia, a little above the ankle, and the upper surface of the foot and toes, are tuberculated. There is a clean indolent ulcer on the same tibia, another on the little toe, three small and sordid on the sole of the foot, and all the nails are broken. Below each groin there is a cluster of enlarged glands, which, on the right side, are three in number, and measure three inches by two, on the left of undefined number, and two inches by one and a quarter in size. At irregular intervals he is attacked with general indisposition, attended by enlargement and pain of these glands, and pain in the sores of the feet and toes. The prepuce is in a state of phymosis, thickened, and covered with scars; the scrotum tuberculated and ulcerated, and the testicles rather small. He has not known his wife nor experienced desire since the disease began, though he has a daughter eight, and a son seven years old, previously born. He had the hair of his arm-pits shaved about a week ago, and it is now short and thin; the hair on the head and pubes is in natural quantity and jet-black. His appetite is unimpaired; pulse 100; respiration of natural frequency; he sleeps little, from general pains of his body and joints, and general itching of the skin; the sensibility seems very obtuse in most parts of the body, some of the tubercles, and some parts of the untuberculated skin are sensible, and others insensible to the prick of a pin. He is easily fatigued by walking, and requested permission to sit down soon after the commencement of his examination, having become faint standing. He was a civil Lascoryn, and married three years before the disease began. It has now existed seven years, and is ascribed by himself to venereal complaints, of which he had several attacks in the form of gonorrhœa, chancre, and bubo, before his marriage. His father, his mother, and a sister are alive and well; nor did he ever hear of any of his relations having had the disease.* Plate II.

Case VIII. of unknown duration, Françoise Antoine, aged 36, a Mozambique slave.

Mauritius, 20th January 1823. She is of a blackish brown colour, with dark eyes and hair, which, though represented to have been once black, is now brown. The face, ears, upper and lower extremities, are tuberculated; the tubercles on the former varying from a pin's head to the half of a hazel-nut in size, hard, smooth, dry, shining, and quite movable over the subjacent parts, the larger less, the smaller more elevated, and generally circular. There are a few on the forehead and along the eyebrows, the latter coalescing; two on the bridge, and a cluster on each wing, of the nose, larger on the right wing which hangs below, and smaller on the left, which appears drawn above its usual level, while the tip is bent downwards and backwards; a few scattered over the cheeks, before the ears, through the upper and lower lips, the last looking like thickened cuticle on the cutaneous, and cicatrized ulcers on the mucous, surface. Near the middle of the hard palate there is one flat tubercle, the diameter of a strawberry, with a depressed centre; and between it and the uvula the rest of the palate is covered with hard confluent tubercles; on the back of the pharynx and betwixt the arches of the palate there are also very small distinct tubercles; the tip of the uvula is tucked back, and appears as if cut off, until examined by a probe: the palate is of a yellowish-red colour, excepting behind the alveolar process, where it is dark and livid. The nostrils are ulcerated, and one of them plugged up with inspissated mucus. The margin of both ears is notched, with pretty large confluent tubercles. On the arms the tubercles are more deeply imbedded, of a larger size, and disposed in clusters, hardly perceptible by the eye; on the fore-arms they are less numerous, more elevated, smooth, and shining; on each elbow there is a grayish black cluster of hard tubercles. The skin of the fingers is dry, shining, and thickened, without distinct tubercles. The tubercles are more numerous on the outer and back parts of the thighs than on the arms; they are large, distinct, and superficial on the upper, back, and middle part of the legs, confluent, more numerous, and nearly surrounding these in descending to the ankles; while the inner parts of the thighs and of the legs above are very little affected. There is a small foul ulcer, encircled by hard tuberculated skin, almost overgrown by thickened cuticle, and discharging little between the great and second left toes; but no other appearance of disease in the feet; and the whole trunk is stated to be unaffected, though there is a superficial ulcer on the breast and another on the arm, ascribed to friction. The tubercles are benumbed in some parts only. The hair of the eyebrows is entirely wanting, of the eyelids rather thin, of the axillæ very short and scanty, and a little appears to have fallen from the pubes. Breasts natural. She has an infant of six months at the breast, but receives her husband less frequently than formerly. Pulse 100 in the upright posture; voice rough and nasal; appetite good; tongue somewhat furred; bowels regular. There is a diffused glandular swelling in the upper and inner part of the left, and a fulness in that of the right thigh. These swellings increase at intervals of from one to three or four months, during a febrile paroxysm, attended by shivering of two or three days duration, and then diminish in size; both sides are never affected at the same time. She left her native country very young, and remembers nothing of her relations. Besides the child at the breast, she has another, at least two years old. Does not know how long she has laboured under the disease; but her mistress says she has been in her present state at least three years and a half.

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* The accompanying coloured drawing, for which I am indebted to Mr Ford, is a reduced copy of a portrait of this patient, taken in Colombo by a Portuguese artist in 1836, and presented to the Military Medical Museum of Fort Pitt by the military medical officers of Ceylon.

CASE IX. of eight years' duration, Cadrewila, aged 25, a Tamul, born at Trincomalie, formerly a pioneer in the Staff Corps.

Leper Hospital, 31st March 1836. The disease began in Kandy, eight years ago, first affecting the left hip, and he was admitted in July 1835. He has no hair whatever on his eyebrows, lips or chin, and the cilia are rather scanty, and of unequal length; the skin of the eyebrows, cheeks, and chin is thickened; there is a light-coloured tubercle on the right side of the chin; a small one on each side of the nasal partition; and the bridge of the nose is unusually broad; the lobes of the ears are symmetrical, though both are thickened by small imbedded tubercles; tubercles are indistinctly felt in the lower lip; and there are several on each side of the root of the tongue, but none on the palate or other parts of the mouth;

the nasal partition is ulcerated on both sides; he has occasionally nasal hæmorrhage, and he speaks in a hoarse nasal whisper. The nipples are smooth, somewhat enlarged, and glossy in their centre. On the left elbow there is a cluster of pale flesh-coloured tubercles, and a large one on the right; he has lost one of the phalanges of every finger, and the greater part of the distal phalanx of the thumb of the right hand, together with one of the phalanges of the left little finger, two phalanges of every toe, and probably one or more of the left metatarsal bones, as already noticed in the general account of the patients at pages 12 and 13. There is an unusually prominent tumour below the left groin, and a less remarkable one below the right. About twice a month he has a febrile attack, lasting two days, attended by pain and swelling in these tumours, and pain in the sores of the feet. There are several imbedded tubercles in the scrotum; the right testicle is small; the left of natural size. His answers, in regard to his sexual propensities, are contradictory and unsatisfactory. Pulse 96, and weak; appetite good; complains of pain in the back and shoulders. The sensibility is very obtuse below the knees and elbows, and also in the thighs and arms, but seems to be unimpaired in the face and ears. He left Trincomalie very young, and has not seen his parents since; but he never heard of any of his relations having had the disease.

Case X. of nine years duration, Adonis, aged 35, a Mozambique slave, a gardener.

Mauritius, January 1823. His colour is a chestnut brown, with dark eyes and black hair, which, on the head, is in natural quantity; on the eyebrows, almost gone; eyelids and beard very thin; axillæ and pubes also thin. The neck and upper parts of the trunk have a natural appearance. The skin of the extremities is dry, harsh, glossy, and subdivided on the surface by very conspicuous lines. Tubercles are thinly strewed over the face, ears, loins, hips, elbow-joints, and lower limbs. On the face they cause very little deformity, being hardly raised above, and neither smoother nor more glossy than the sound skin, hard and of irregular outline, varying from the smallest size to that of half a grape. The nose and ears are slightly swollen by tubercles, occupying their margins and lobes. There are a few on each cheek; a greater number on the forehead and eyebrows; none on the lips, chin, or inside of the mouth. The nasal partition is ulcerated and discharging purulent matter; the uvula misshapen, and an inch in length; there are two slightly raised white spots on the soft palate, and the back of the tongue is very rough. There is a confluent cluster on each elbow, with a dry scab in the centre; one small tubercle on the back of the right, and several on the back of the left arm; only one distinct tubercle on the hands, at the proximal joint of the thumb; and a very small ulcer on the back of one ring finger, but the skin is hard, thickened, rough, and cicatrized; the joints are stiff; and the left little finger has lost two phalanges. The scrotum is beset with small shining confluent tubercles; the testicles are of their natural size; and the left spermatic cord relaxed. There are numerous small, distinct, shining, oval tubercles on the loins, hips, and backs of the thighs; tubercles, much larger, more numerous and confluent on the knee-joints; and fewer again over the lower part of the legs, where the cellular membrane is indurated, or the skin bound. He has lost the right toes, with the exception of one phalanx of the great, one of the second, and one of the little; yet the nail of the first-mentioned toe remains. There are several cicatrices on different parts of the foot, and a deep circular sore, two-thirds of an inch in diameter, under the ball of the great toe; a small ulcer between the left leg and foot, and another on the sole; and the first bone of this great toe is exposed, without any active ulceration. On the upper and inner part of each thigh, there is a hard oval swelling, with an irregular surface, 2½ by 1½ inches in size, following the direction of Poupart's ligament, but some way below it. Pulse 108, and extremely feeble; skin cold; respiration natural; voice hoarse; appetite good; bowels regular. He has been nine years affected; for eight years of that period he was in the habit of indulging his sexual propensities; but thinks the disease was aggravated by such indulgencies, and he has had no inclination for them during the last twelve months: he was brought to the island very young, and has no knowledge of his relations.

CASE XI. of 15 years' duration, Charles Robertson, aged 25, born in Columbo, his father being a captain in Her Majesty's 19th Regiment, his mother a Singhalese.

Leper Hospital, 7th April 1836. He was sent to the Orphan School at eight years old; the disease began at ten, on the cheeks, chin, and right hip, and he was admitted into this hospital in September 1825. He is of a yellowish-brown colour, with black hair and dark eyes. A few short and distant hairs only remain on the eyebrows; there are none on the under, and six or eight only on the inner and outer ends of the upper eyelids. The tubercles are a very slight shade darker than the unaffected skin. The eyebrows are full and thickened; the nose is enclosed between two tubercles, which pass obliquely downwards and outwards from the inner angles of the eyes, the right tubercle being more elevated than the left, and coalescing on the cheek with another from the outer angle of the eye; the bridge of the nose is tender on pressure, depressed and separated from the tip and wings, as are these from each other, by deep furrows; the tip consists of a round tubercle, the size of a large grape; the left wing of two, and the right of one, which is doubled upon itself, and fills up the nostril. These parts are smooth, shining, and overrun by large blue branching veins. The partition of the nose is perforated by an ulcer, discharging purulent matter and blood, and on the back of the throat are several distinct tubercles. In addition to those already mentioned, there are imbedded tubercles in the cheeks, a little more distinct in the right than the left; two of a small size near the middle of the upper lip, affecting its symmetry, several smaller still on the under, and a low cluster on the chin. The ears retain their symmetry, though thickened and enlarged by smooth, shining, coalescing tubercles. The right nipple is an inch and a quarter across, and three-quarters of an inch deep, smooth, shining, painful on pressure, and subject to itching, The left nipple has its usual size and appearance, but a dark, somewhat raised areola around it. There are no tubercles on any part of the trunk, but numerous itch marks. The outer and back parts of the arms and fore-arms are pervaded by tubercles, tolerably large on the former, smaller and copper-coloured on the latter; while the skin of the elbow joints is hard, thickened, and flesh-coloured, with several thin brown scabs; of the back, flabby, dry, and shining; of the fingers, thickened by imbedded tubercles, with itch sores, and the nails are unchanged, excepting that of the right middle-finger, which is divided in its length into two halves, and slopes on each side, from a soft unprotected ridge between them. The scrotum is relaxed and pervaded by tubercles; the testicles rather small; the prepuce in a state of natural phymosis. The skin of the lower extremities, including the hips, is thickened and tuberculated; and the left leg, from the knee downwards, is affected with *Bucnemia tropica*, which began five years ago, first in the calf. This leg is greatly swollen, and its skin hard, thickened, immovable over the muscles, uneven and shining, with three or four deep, narrow, transverse grooves betwixt it and the foot. Behind and on the back of the great and two contiguous toes, there are tubercles of a stony hardness and smooth surface; the toes are swollen; the nails thickened and broken; the back of the heel and ankle thickly studded with red raw tubercles; and there is a deep foul ulcer on the inner side of the right foot; the great toe is of natural size, and has a perfect nail; the second and third are represented by two short stumps, half-an-inch long externally, but separated by a cleft less than half that depth, without any vestige of nails; and he states that each of them lost two bones five years ago: the fourth is short, slender, and has no nail, but neither it nor the little toe, by the patient's account, has lost any portion of bone. There is a large glandular swelling below each groin, less remarkable on the left side, where, by his account, the size has diminished since the bucnemia appeared. He suffers attacks of fever about once a-week, of a day and a-half's duration, with pain in both, and increased swelling and colour of the left foot and leg, sometimes also of the femoral swellings. The testicles have sensibly grown since the disease appeared, and are now little less than their natural size. The hair of the pubes is diminished, and of the arm-pits very scanty. Pulse 124; appetite good, excepting when fever is present; sleeps generally well, but is sometimes disturbed by itching and pain of the joints; inspirations audible, but not noisy. The feeling is very obtuse in the limbs, particularly below the knees and elbows. His mother died two years ago; he has a brother alive; the only other maternal relation he ever knew was a grand-uncle, and none of them had the disease.

The following case, with which I shall conclude this section, is probably an example of tubercular elephantiasis, combined with molluscum, as described by Dr Bateman.

Colombo, 26th March, (year omitted,) Abooaka, aged about 40, a Moor, a boatman, a native of Katoomawade, 25 days in Colombo, of a dark-brown complexion and black hair, intermixed with gray. His whole body, comprising the face, trunk, and limbs, is studded with tubercles, varying in size from a small walnut to a pin's head, the larger more narrow at the base than the summit, resembling in form a bee's hive, and connected to the skin, which moves freely over them by cellular membrane, the smaller either flat and imbedded in the skin, or shaped like the larger, and rather hard, excepting a thin most prominent part, where they feel soft, from their looser attachment there than elsewhere to the cellular membrane, which unites them to the skin; a few are shining, but the greater number, whether large or small, are dull. One of the largest is on the forehead, immediately under the hairy scalp, and is depressed or flattened horizontally; there is another of a smaller size above the outer angle of the left eye; one, the size of a large pea, projecting to the left from the tip of the nose; another, only half so large, depending from the outer margin of the left nostril. A few stand out around the mouth; one or two are imbedded in the lips, and a great number in the cheeks, forehead, and other parts of the face; two or three on the backs of the ears, but none in the margins or lobes; there are some the size of cherries or larger on the back; one of these overhangs the right axilla; there is one with a broad base under the inside of the left knee, and numbers of a small size, both elevated and imbedded, over the trunk, hips, and limbs; the largest of all is seen on the abdomen overhanging the umbilicus. There are two of a pretty large size on the back of the left wrist, and several projecting from the backs of the fingers. The cuticular depressed lines are either obliterated or indistinct over the tubercles, and some of the larger have a minutely granulated surface. The hair is rather scanty in the axillæ; in natural quantity on other parts. There are no ulcers in any part of the body, but a small glandular tumour on the upper and inside of each thigh. He states that he has been married ten years; that he has had the disease since he was a little child; that he had two infants born with it upon them, of whom one lived a month, and the other two months after birth; that his wife is again in the family way; and that he lost a brother, a sister, and a grand-uncle by the disease.

(To be concluded in Next number.)

ART. III.—*The Forces by which the Blood is circulated in Capillary Vessels.* By G. CALVERT HOLLAND, M. D., Physician to the Sheffield General Infirmary.

INQUIRY I.—*The prevailing Opinions on the character and variety of Capillary Vessels.*

THE extraordinary discrepancies of opinion respecting the functions of capillary vessels are evidence of the abstruseness and difficulty of the question. Scarcely any two physiologists entertain the same views. The subject is, indeed, exceedingly complex, necessarily including the investigation of several powers, all more or less associated in the production of one effect, the circulation of blood. The physiologist, as an essential step to the examination of the functions of the capillaries, must have clearly defined ideas in regard to the measure of co-operation derived from the heart, the arteries, the veins, and the alternating changes of the chest.

Having already studied at length these several subjects, we are prepared to enter upon the present inquiry, and shall point out fallacies in generally received doctrines which are to be traced to ill-conceived, rather than to badly executed experiments.

Some of the earlier physiologists, especially Whytt and Cullen, ascribed to the capillaries a much greater influence than is accorded to them by the moderns. It will, however, be our object to show that the views of the former are, in a great measure, correct; and are alone adequate to explain many of the phenomena of circulation. After detailing the opinions which are, or have been entertained respecting the character and variety of capillaries, we shall pass to the examination of the numerous experiments adduced as evidence, that these vessels are not endowed with contractility, or in any degree facilitate the motion of blood.

The exceedingly minute vessels which require the aid of the microscope to discern them, have been designated capillaries from their extreme fineness. They are found abundantly, but not in equal proportions, in every part of the body, and some writers have considered the animal structure as entirely composed of them. The capillaries are the last divisions of the arteries, and the attenuated roots of the veins, connecting directly the arterial and venous systems, as is proved by injections, and the examination of capillary circulation in the field of a powerful lens. In the former case, the injection passes from the larger arteries into the larger veins; and in the latter, the blood is seen to move slowly, but continuously through the net-work of minute vessels. The direct connexion of the two systems, by means of intermediate capillaries, is a point that can scarcely be said to admit of dispute. It has, however, been called in question by two modern physiologists. M. Doellinger imagines that the arteries, in their last divisions, have no parietes, and that the blood moves, destitute of such, through a peculiarly organized matter, which he calls mucus. One part of the vital fluid is considered to be converted into this, and the other is said to pursue its course, passing into capillary veins and lymphatics which arise from this substance, in the same manner as the arteries terminate in it. M. Willbrand advocates a still more extraordinary doctrine. He supposes that the whole of the blood during its circulation is converted into organic matter, mucous substance or secreted fluids; and that a proportionate quantity of blood and lymph is contributed, or thrown off by the different organs; and hence the circulation is maintained as if the arterial and venous systems were directly connected. It is considered by these physiologists that there is no evidence derived either from injections or the magnifying power of the microscope, clearly establishing the direct termination of arteries in veins. The fact, however, is placed beyond all doubt by delicate and successfully conducted injections; and, as already remarked, the flow of blood from one set of vessels into another is readily detected by the microscope. We record such opinions, not from their value, but their extravagance.

The capillary vessels differ greatly in size. Some admit several globules abreast, others only two or three; and some are so exceedingly minute that they receive only one globule. They all anastomose extensively with each other. In regard to the structure of them, little or no positive light is afforded by actual observation. To express an opinion is to offer a conjecture on the subject. Though incapable of determining, from a knowledge of their structure, the vital properties with which they are endowed, the study of their functions, under different circumstances, will facilitate the inquiry, and dissipate much of the obscurity in which the question is involved. The capillary artery and vein may contain either red or colourless blood, according to the size of the vessels and the nature of the organs or tissues in which they are distributed.* Haller, and the physiological authorities succeeding him, endeavoured to prove that an artery terminates in one of the following modes.

1. Either directly in a red vein or veins. 2. In excreting ducts. 3. In exhalants. 4. In lymphatics. 5. In the colourless artery.

A similar view is also taken by Bichat. The existence of these vessels carrying, with the exception of the red vein, the colourless part of the blood, is an opinion which is entertained by Boerhaave, Vicussens, Ferrein, Soemmering, Chaussier, and the majority of anatomists and physiologists of modern times. The advocates of this doctrine adduce as evidence, microscopical observations, injections, and the changes occurring in white and transparent tissues during inflammation. Vessels which in health carry a colourless fluid are at this time strongly injected with blood.

Prochaska, Mascagni, Richerand, and others deny the existence of these vessels. It is not our intention to examine the proofs or arguments advanced by either party. This task, to which our ability is altogether unequal, has been undertaken by others in every respect fitted to do it justice; and the conclusion arrived at is, that there is no satisfactory or positive evidence in favour of the existence of such vessels. It is, however, probable that arteries have other terminations than in veins, though there is no proof but what is liable to objection.* The nutrition and other vital actions, in parts of the body in which no such vessels are observed, seem to demand a more extensive circulation than the ascertained and acknowledged channels of supply.

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* Eements of General and Pathological Anatomy, page 136; by David Craigie, M. D. A work replete with much valuable information.

Many ingenious views have been proposed to account for secretion, absorption, and nutrition; but whether these functions be effected in peculiar vessels, or in the ultimate divisions of the arteries, modified in their distribution to different organs, is yet undetermined. Were we to enter more deeply into this branch of inquiry, it would only be to detail the crude or refined speculations of men who, in their investigations, have too often allowed themselves to be guided by imagination rather than by the sober and inductive principles of philosophy. The only important point to which the attention is solicited by these introductory remarks, is simply that arteries terminate directly in veins; a conclusion almost as unquestionable as the circulation of blood. Such connection existing between the arterial and venous systems, it will be readily conceived that whenever the circulation of blood is disturbed in the larger arteries and veins, the intermediate and associating net-work of vessels will, also, necessarily be deranged. Admitting that these vessels are almost passive in the process of circulation, they will inevitably be affected by every modification in the flow of blood to, as well as by, every impediment to its transmission, from them. All that is here contended for would occur, were the capillaries inert tubes. If, however, endowed with vital properties by which the course of the blood is influenced, it is evident that the function, whatever it may be, which they exercise, cannot possibly be carried on, as in health, when the whole of the circulatory system is disordered by the experimentalist. To increase or diminish the supply of blood to them, or to retard its flow in the larger veins, will necessarily induce corresponding changes in their action.

Results obtained, under such circumstances, in investigations to determine either the course of the blood in the capillaries, or the influence of these vessels, are, as we shall subsequently prove, open to formidable objections. No experimentalist, in his researches, has taken these modifying causes into serious consideration, or has appeared even sensible of their existence. Whether the object was to ascertain the propulsive force of the heart, the action of capillaries, the agency of the venous system, or the alternate changes in the capacity of the chest on the motion of the blood, in no case, was there any calculation of the amount of the disturbance induced by the direct interference of the physiologist, essential to be known previous to the adoption of any conclusion.

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* See the opinions of Magendie on the Lymphatics.

How closely soever we examine the labours of one of the boldest and most enterprising of modern inquirers, Magendie, we meet with no passage in contradiction of this broad and unqualified assertion, but, on the contrary, experimental researches and arguments painfully illustrative of its truth. The value of our exertions will consist in pointing out the modifications unavoidably produced in the functions of the capillaries, especially in all experiments to ascertain the forces employed in the circulation of the blood, in which the animal is mutilated, tortured, or placed in a constrained position.

INQUIRY II.—*An examination of the Experiments which have been performed to elucidate the Functions of the Capillaries.*

The object of the present inquiry is to point out the inadequacy of the experiments adduced by writers to ascertain the forces employed in the circulation of the blood. The experiments will be drawn from first authorities, and such only will be brought under consideration as are imagined to be fully established by their simplicity and unequivocal character. If the intention is to analyse or measure the functions of a particular organ, these ought not in any degree to be disturbed by the procedure adopted. The importance of this rule is so obvious, so indispensably necessary to insure accurate results, that it will scarcely be supposed, that any inquirer ever failed to appreciate it, or to guard against its infractions. Physiologists, so far, however, from being guided by it, have, in few instances, studied it in their investigations. In evidence of the truth of this assertion, we shall briefly examine the conditions essential to the natural action of the capillaries, and then, the experiments which are confidently stated to demonstrate the want of propulsive power or co-operation in these vessels in the process of circulation.

In our preceding labours, we have shown how discrepant are the prevailing opinions on the phenomena of circulation. Each division of the system in which the blood flows has its zealous partizans, and the conclusions on which they repose are traced to experiments, and are so strengthened by arguments, that it seems the extreme of boldness to doubt their validity. Such being the diversity of opinion, it is imperative on the experimentalist, in the researches made, to establish his own particular theory, not to disturb the several functions imagined to be engaged in the process of circulation. Unless these be scrupulously maintained, the results at which he arrives neither confirm his own nor disprove the views of others. Whatever be his own theory as a philosophical inquirer, he must guard against all interference with these functions, otherwise his inferences will necessarily be as worthless as the data are confused from which they are deduced.

The forces on which the motion of the blood depends, according to some writers, are four, the heart, the arteries, the capillaries, and the agency of inspiration. These are imagined to co-operate in very different degrees in the production of the phenomenon; and, of course, by others it is contended that it is by one or two only of these forces that the blood is urged forward. If, therefore, the object is to ascertain the exact influence of any one, it is evident the means employed will be imperfect, and liable to insuperable objections, if the natural relations which one force bears to another be seriously modified.

Suppose we wish to estimate the action of the heart, or rather, the extent of its co-operation in the circulation, the experiment to determine this must clearly not at all interfere with the conditions of the other powers. The arteries and capillaries must receive neither more nor less blood than usual. If they receive more, they may be incapacitated from acting; and if less, the result of their operation can be no criterion of their ordinary influence. The larger arteries are considered to contract or return upon the blood with a force equal to that by which they have been distended; but, if they receive more or less than is compatible with the proper exercise of their functions, the experiment will at once be admitted to be imperfect, because, in attempting to determine the measure of one force, it has annihilated or disturbed others.

In order to illustrate our views, we shall again recur to the celebrated experiment of Magendie, which is regarded as demonstrating that the motion of the blood in capillaries and veins is wholly dependent on the action of the heart. No other experiment in this department of physiology is equally well known or adapted to our purpose. In analyzing the labours of this physiologist, or the researches of others, in reference to the functions of the heart, the arteries, the capillaries, or the veins, this experiment is forced on our consideration. The facts which it is deemed to establish have the same important relation to all these vessels, and, consequently, in studying the office of each, it is again necessarily brought under review in connection with new phenomena, or in circumstances of novel interest. The conclusions drawn from the experiment are not false only with respect to the arteries, but equally so with respect to the capillaries and veins. It is indeed a comprehensive fallacy, pervading the whole of the reasoning of this bold and enterprising physiologist, and has been adopted by the highest authorities, as one of the indisputable truths of the science. The experiment is thus described in his own words.

"After having passed a ligature round the thigh of a dog, that is, without including the crural artery or vein, apply a ligature separately upon the vein near the groin, and then make a slight opening in this vessel. The blood will immediately escape, forming a considerable jet. Then press the artery between the fingers, to prevent the arterial blood from reaching the member; the jet of venous blood will not stop on this account; it will continue some instants; but it will become less and less, and the flowing will at last stop, though the whole length of the vein is full. If the artery be examined during the production of these phenomena, it will be seen to contract by degrees, and will become completely empty. The blood in the veins then stops; and, at this period of the experiment, if you cease to compress the artery, the blood injected by the heart will enter, and, as soon as it has arrived at the last divisions, will begin to flow again at the opening of the vein, and by little and little, the jet will be established as before."

This experiment is imagined to prove that the impulse of the heart is transmitted through arteries, capillaries, and veins, and, consequently, demonstrating that the motion of the blood is not influenced by, or at all dependent on the capillaries. It is, in our opinion, one of the most inconclusive experiments in favour of the action of these vessels, that is to be found in the whole range of physiological researches. The analysis of it will show that it possesses none of the conditions necessary to secure the attainment of the object in view. The intention is to determine whether the motion of blood depends on the heart alone. This is the problem he proposes to solve. We have already stated that an experiment is imperfect and liable to serious objections, if the relations existing between the functions investigated, co-operating in the production of the same effect, be disturbed. Does the experiment in question maintain the natural relations of the heart, arteries, capillaries, and veins? It deranges, indeed, the whole series. The arteries cannot act on the circulating fluid, as in the ordinary states of the system; nor can the capillaries, for in one stage of the experiment they are actually not supplied with blood. The contents of the vein are altogether removed from the influence of inspiration, or the suction power of the right side of the heart, so that the way in which the blood is shown to move in these vessels is no evidence of the causes in operation in the ordinary conditions of the sanguiferous system. On making a slight opening in the vein, the blood immediately escaped, forming a considerable jet. If the artery, at this moment, however, be pressed, so as to cut off the influence of the heart, " the jet of venous blood will not stop, on this account; it will continue some instants." It is here distinctly admitted that the blood flows from the vein when it is not under the influence of the heart. According to his own reasoning, it ought to have ceased flowing almost immediately after intercepting the impulse of this organ. It is further remarked, the " jet will become less and less, and the flowing will at last stop, though the whole length of the vein is full." The gradual diminution of the jet would occur, were the capillaries the only force to which venous circulation could be attributed. The flowing continues, according to his own account, until the artery pressed upon is completely empty; in other words, the jet is not arrested, as long as there is any blood transmitted to the capillaries. He deprives these vessels of blood, and then, when clearly incapable of furnishing a supply to the vein, necessary to maintain the jet, he regards the phenomenon as unequivocally proving that the motion of blood in capillaries and veins depends exclusively on the action of the heart. It is remarkable that one so familiar with experimental researches, and who has laboured with assiduity to prove that many of the phenomena of life, and especially those of circulation, are alone explicable on mechanical principles, should have neglected altogether the study of the conditions of the several functions investigated. Attention to these conditions is imperative, whether the attempt be to explain the motion of the blood on mechanical or vital principles. From the character of his mind and the tendency of his pursuits, we should have expected him to have been keenly alive to the obvious and disturbing causes of the experiment.

The whole length of the vein is full when the artery is empty, and the jet has entirely ceased. The cessation of the jet is no evidence that it arises from interruption to the influence of the heart. The same result would be observed were the capillaries the cause of venous circulation. The blood flows from the vein as long as the capillaries have any fluid to send into it. If none exist between the root of the vein and the point of the artery pressed upon by the finger, whence is the power to be derived to act on the blood in the vein?

The object of the experiment being to show that the venous current is propelled by the heart alone, and that the capillaries do not in any degree affect it, in common justice to these vessels they ought not to be deprived of blood. It is unphilosophical to withhold the fluid by which they are stimulated to contraction, and then to accuse them of the want of power. Suppose another experimentalist were to prevent the blood flowing into the heart, and observing the arteries full to distension, were to call our attention to the fact, as evidence that the contents of these vessels were not at all influenced by this important organ, we should naturally object to the conclusion. But the capillaries are placed precisely in this situation. There is no difference between them and the heart in the case supposed. The artery from which they receive their stimulus and source of contraction is empty, and, consequently, the supply is cut off. There is a column of blood in advance of them, but there is none, *a-tergo*, by which to act upon it. To imagine the capillaries at this time capable of urging forward the column, is indeed a strange perversion of reason and of the sound rules of philosophy. The artery is admitted to be empty, and there is also evidence that the capillaries have transmitted forward the whole of their contents. It is stated that when the jet stops, " if you cease to compress the artery, the blood injected by the heart will enter, and as soon as it has arrived at the last divisions, will begin to flow again at the opening of the vein, and by little and little, the jet will be established as before." This is in direct confirmation of the argument urged on the consideration of the understanding. The flowing of the blood does not take place until the artery and the mass of capillaries have received an abundant supply, and even then, the jet is not re-established at once, but by little and little. The manner in which the jet is formed is not consistent with the view entertained by Magendie. The blood does not flow until that transmitted by the artery reaches the last divisions, that is, until it has filled the capillaries, and even when there is a continuous column extending from the point of the punctured vein to the point of the left ventricle, this, though regarded as the cause of venous circulation, does not immediately re-establish the jet. If the blood move only from the impulse of the heart, and the impulse be freely transmitted, this ought to be the case. It is evident, from the latter part of the extract, that the capillaries, previous to the finger being removed from the artery, are quite empty, the blood in the vein not being at all influenced until the arterial current has reached the last divisions. Were these already} possessed of bood, the venous column would necessarily be urged forward as soon as the arteries were supplied.

In the analysis of this celebrated experiment, we have confined the attention to broad and obvious facts. The wish has not been to point out subtile and refined distinctions, but such as can only be ,traced to a gross neglect of the just principles of philosophy. The detection of such errors has a value far beyond the several truths it may establish, or the facilities it may confer on subsequent inquirers, by the removal of false facts and false theories out of the path of investigation. The understanding that fully appreciates the force and tendency of the spirit of these remarks has gained an important step in knowledge—has had its attention aroused to the study of phenomena fraught with great interest and practical value. This knowledge will be useful on all occasions when the judgment is appealed to by the experimental physiologist, who is constantly forgetting that his researches are into matter endowed with the properties of life, and mysteriously combined in the production of vital phenomena; or insensible to the numerous difficulties which nature opposes to his rude method of interrogation.

According to the analysis of this experiment, the motion of blood in the veins is not shown to depend on the heart. The evidence is so far from being satisfactory, that the same experiment may be used to prove the reverse of the argument, viz. that venous circulation depends mainly on the capillaries. The jet is admitted to continue after the impulse of the heart is wholly intercepted; indeed, as long as there is any blood in the artery and capillaries. How is this to be reconciled with the doctrine, that the blood is moved only by the heart? The manner in which the jet is re-established, may be shown to be explicable on the gradually improving condition of the capillaries. These vessels cannot at once be restored to vigorous action by the influx of arterial fluid. At first this action is feeble, and the influence exerted on the venous column proportionably weak, but this increases in strength as the vessels acquire their natural tone and energy.

The same experiment has recently been performed by Magendie, and attended with circumstances of peculiar interest. On the repetition of it, the blood flowed from the vein without any jet, or "the ordinary effects of the heart on the circulation being witnessed." This he attempts to explain by stating, that the animal was weak from the previous injection of water into the veins. Is it then to be inferred, that the blood in these vessels is propelled by the successive contractions of the left ventricle only when the vital powers are vigorous?

A subsequent experiment, performed on a healthy animal, and which deserves particular attention, is thus described.

"But to return to our experiment. We chose a much stronger dog than the last, and took care to avoid everything which might influence in an unfavourable manner the production of the wished-for result, for these experiments are difficult, and require a great deal of caution and management; the crural vessels of the hinder leg were exposed; here they are the artery and vein running close to one another; the main nerve was cut away. If the parts be left in the condition in which you now see them, we shall not be able to obtain the proper phenomena, because the collateral branches would constantly furnish an intermediate current of blood; it is, therefore, necessary to pass a circular ligature round the limb, above the point where the vessels are exposed, but not embracing them; by this means the circulation in the leg will be confined to the femoral artery and vein. Having taken this necessary precaution, I now place a ligature on the femoral vein, and make a small opening through the parietes of the vessel; the jet of blood is, as you see, very strong, though small, but the alternate impulses of the heart are not marked by the alternate elevations of the stream; of this you already know the reason. I now take the artery between the forceps, and compress it a little; the jet diminishes at once; I increase the compression, and the stream continues to fall; it is lower, lower, lower, and now it has ceased altogether. When I withdraw the forceps, and give free liberty to the artery, the force of the heart is permitted to be felt, and the stream immediately recommences to the same extent as before; when, on the contrary, I press on the parietes of the artery, the jet, which was more than a foot in height, falls, as you see, to a few lines; it does not cease altogether when the cavity of the artery is obliterated, and the passage of blood through it is consequently stopped; for, the venous system being full of fluid, and endowed with a high degree of elasticity, continues the jet by its proper action for a short time after the motion communicated by the heart has been interrupted."

The experimentalist admits that, when the vein is punctured, the blood which is projected is not marked by the alternate impulses of the heart. The theory on which this may be explained is at this moment of no consequence. The fact alone concerns us. It is also stated that the jet continues when the impulses of the left ventricle are no longer communicated, and this is accounted for on the distension of the veins, and the elasticity with which they are endowed. Let us confine the attention to results described in his own words, and then the amount of evidence urged in favour of the direct action of the heart on the venous column will be clearly apprehended. The jet is not caused by the contraction of the left ventricle. This he acknowledges; nor is it arrested by the cessation of this contraction; it therefore follows that this phenomenon is no part of the evidence on which he founds his views. The fact on which these alone rest is, that the stream flowing from the vein is more or less modified by the condition of the artery. When the blood is allowed to pass freely through it, the current projected from the vein is strong. When intercepted by the pressure of the finger, it is correspondingly weakened.

We most freely admit that the stream which escapes is modified according to these circumstances. This effect we should have anticipated antecedent to all experiments, knowing the direct connection between arteries and veins. To illustrate the nature of our objection, suppose that two individuals look upon a stream of water exposed, at two points only, to the day, the space intermediate being concealed from view. At one point, it is seen to pass beneath the ground and is lost; at another, it is observed to issue from it. This is precisely the case of the arteries and veins in the experiment in question. The blood is seen to pass through the one and issue from the other. The space between the two is occupied with minute vessels, which are not perceived in the experiment, and thus it may not inaptly be regarded as the ground which conceals from observation the circuitous meanderings of the arterial fluid. The two individuals might possibly dispute concerning the causes by which the motion of the water is influenced. One might contend that the stream which issues again into day is urged forward by forces acting upon it previously to disappearing from sight; the other might assert that it was modified by circumstances existing between its entrance and exit. To settle the contention, one proceeds to make a bold and exceedingly original experiment. Regarding the other with that confidence which a sense of superiority usually confers, he exclaims, "You will see that when the water which enters the ground is diminished in quantity by partially arresting or diverting its course, that which escapes from it will be correspondingly lessened in quantity. If none be allowed to enter, none will issue. Can you possibly desire a more conclusive experiment?" The other might justly reply, "The experiment proves nothing but what might have been anticipated. I admit that the stream which escapes from the ground will be proportionate in quantity or strength to that which enters; and this is all that the experiment confirms. The circumstances imagined to exist between the two points cannot act unless they have something to act upon. Nor do the changes in the strength of the current escaping, corresponding with the modifications previously induced in it, disprove the influence of these circumstances." The experiment of Magendie establishes simply the same fact. The stream which flows from the vein varies in strength according to the quantity of blood allowed to pass through the artery. How can it possibly be otherwise, if a direct connection exists between arteries and veins? The jet is described as falling from a foot to a few lines, when the pressure of the finger arrests the passage of the stream through the artery. This is quite natural. How can the height of a foot be maintained, if the vein is not supplied with blood? It would be absurd to calculate on the water-wheel continuing to exercise its propulsive power when the course of the stream is diverted.

The jet is not arrested when the action of the left ventricle is entirely intercepted; and yet the doctrine taught is, that the blood in the vein moves only from the direct impulse of the heart. The physiologist endeavours to get over this difficulty, by the aid of two suppositions—the fulness of the venous system and its high degree of elasticity. The mere fulness of a vessel cannot be any source of motion. The elasticity of it, when the power by which it is distended is withheld, cannot generate a propelling force. This inherent property of the vessel comes into play on the cessation of the cause which urges the fluid *a-tergo*, but it is incapable of producing a series of successive contractions. To argue for such an influence is to contend that the vein has within itself a power like that of the heart, by which the fluid is transmitted regularly in its course. If endowed with this power, how is it that, when the jet has altogether ceased, the vein is full of blood; a condition which is alluded to by the physiologist, and adduced as an argument in support of the direct action of the heart? If the vein possesses such power, why does it remain distended? According to his own reasoning, if the fulness and elasticity of the venous system are capable of producing the jet, why does he not maintain these conditions in the experiment, to determine the additional influence exerted by the heart? So far from attempting it, or deeming such procedure necessary, this influence is intercepted in the artery; the mass of vessels between this and the vein are no longer in a state of distension or supplied with blood, and then, because the jet is no longer observed, he presumes to have proved that the capillaries play no important part in the process of circulation. Every interference which disturbs the natural condition of these vessels, giving them either more or less blood than they receive in the uninterrupted actions of the system, invalidates the experiment. The phenomena evolved, under these circumstances, are not the ordinary language of nature, and to interpret them as such is to disregard the sound rules of philosophy the dictates of common sense, which is philosophy without its subtilities and refinements.

This physiologist, by another experiment, seems to imagine that he has for ever set at rest the question of venous circulation. The influence of the capillaries will never again solicit attention, except from the dreamers and dabblers in science. The experiment is thus described by him, and, in the consideration of it, will be found an admirable illustration of the justness of our strictures:—

"I now proceed to make an experiment which is even more decisive than the former. The impulse of the heart will be replaced by artificial means, and you will witness analogous effects. I now push a quantity of warm water into the femoral artery, and the jet from the vein is immediately increased in proportion. I cease to act on the piston. The stream falls considerably, as you must remark. This is done several times, and the result is always the same. The more forcibly I inject the warm water, the more perfect and rapid is the jet from the vein. Were the animal larger, you would see this much better. What you have witnessed, however, is sufficiently convincing, for nothing, in my opinion, can prove more directly the easy and immediate passage of fluid from an artery to a vein, and the manner in which the contraction of the heart produces this effect in the living subject."

Should this experiment, and the theory with which it is associated, be transmitted to distant times, it will be adduced as evidence of the little progress of physiological science in our day. It will stand out boldly, enunciated by a high authority, and implicitly received by contemporary and master spirits of the age. Comments on such an experiment are scarcely necessary. The physiologist, to prove that the blood in the veins is propelled entirely by the heart, the capillaries exercising no influence whatever, distends with water the whole series of vessels between the artery and the vein, and, observing that this flows out of the one vessel, as he forces it into the other, he seizes the result as establishing the direct action of the heart. The stream which escapes, ebbs and flows according to the varying strength and quantities of the injection, and were it not to present this coincidence, it would be a phenomenon, an exception to the laws of physics, and would be more difficult of solution than the functions which it is the object of the experiment to elucidate. Let us pause to examine the conditions of the vessels in this experiment, and to point out their wide departure from those which exist in the natural states of the system. This inquiry, as already remarked, has a value beyond the exposition of a single fallacy. It brings under consideration the phenomena of life, and endeavours to facilitate the study of them by exhibiting errors in previous investigations.

I. The arteries, capillaries, and veins, are never full to distension in any condition of the animal system. It is an impossibility, and incompatible with life. In these circumstances, one propulsive power only could act. The contractility or elasticity of these vessels would have no room to play its admitted part in the process of circulation. The distribution of the vital fluid is constantly varying in these several series of vessels. At one time, the veins contain the greater portion of the blood in the body. At another, the arteries are more than usually supplied. Were both these vessels and the capillaries full to distension, such changes would clearly be impossible.

II. In the experiment not one drop of water issues from the vein until the vast series of vessels between it and the artery are filled to distension. Every ounce of water, afterwards injected, must displace a corresponding quantity. In this experiment neither the arteries, the capillaries, nor the veins can exercise the slightest influence. They become as inorganic tubes, and therefore in what way does the experiment elucidate the phenomena of circulation? What light does it throw on the functions of these vessels, when their vital and physical properties are alike incapable of action?

III. To determine the action of the capillaries, these must be supplied with blood, and not water, and they must receive their own proper stimulus, in such quantities as nature alone can regulate. The physiologist must not presume to measure it. He knows nothing of their varying necessities. When he flatters himself that he understands them, and attempts to imitate the delicate and susceptible powers by which the supply is beautifully adjusted to the demand, he forgets the duties and the character of the philosopher. He cannot penetrate the secrets of nature, except by studying the phenomena which she places under observation. When he mutilates an animal with his scalpel, dividing artery from artery, and nerve from nerve, and pursues his coarse investigations regardless of all vital laws and principles, the answers which he wrings more frequently mislead than open upon the mind enlarged views and comprehensive truths. The false facts of physiology, rivetted upon the understanding by experiments, are the difficulties opposed to the sound progress of the science. In our own day and country there is, however, one experimentalist standing out from the multitude, that groped not after truth in the midst of perplexities and confusion, allowing experiment to precede profound reflection. The strictly philosophical method which he pursued will be as valuable to succeeding inquirers as the originality of his discoveries. He, almost alone, of all physiologists, has treated nature with delicate consideration.*

Though it is fully established that arteries terminate in veins, it is not to be inferred that this is their only termination, or that capillary vessels at present rather conjectured than proved to exist, may not be constantly pouring their contents into the venous system, by which the blood may be modified, not only in quality and quantity, but indeed in circulation. That the blood, in its complicated circuit, both acquires and loses a something essential to the well being of the vital powers, is a fact which demands no confirmation. The nature of what is thrown off in the minute vessels, or converted by them into organic structure, or the manner in which these changes are effected, are among the mysteries of science.

The experiments of Magendie take into consideration none of the modifying circumstances of vitality; and in the rashness of his procedure, conditions are induced which prevent the exercise of physical properties, which he regards as the cause of the phenomena of circulation.

In the experiment, in which the jet is emitted from the vein, with more or less force, according to the current flowing along the artery, in one stage of it, the intermediate mass of vessels will necessarily be distended or placed in unnatural circumstances. When the stream ceases to escape, the vein is admitted by the experimentalist to be full, so that here is a column of blood at rest, and cannot possibly be urged forward until the numerous vessels, between this point and the compressed artery are in a state of distension. At this moment there is no blood between the vein and the artery. It passed from the latter to the former after the influence of the heart was intercepted; and consequently the column in the vein will remain at rest until the current of the liberated artery has filled the intermediate space. In this case there will be a continuous column extending from the artery to the punctured vein, and on this the heart will act, as the piston acts upon the vessels distended with water.

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* Sir Charles Bell.

In the undisturbed state of the system, such is not the condition of the arteries and veins. The ligature which is passed round the thigh of the animal confines the circulation to the crural artery and vein, and the intermediate mass of vessels connecting the two. The artery receives no supply from lateral communications, nor can the vein transfer a portion of the pressure to which it may be subject, to branches by which it is equalized. It is therefore evident that the heart acts upon a diminished column of blood, and this so narrowed in its sphere of motion, that the vessels in which it flows will clearly be in a state of forced distension, when the jet is projected from the vein. Under these circumstances, the arteries, capillaries, and veins, cannot possibly exercise the influence which they are admitted to exercise on the course of the blood in the ordinary conditions of the vital powers. The experiment throws no light on the functions of the capillaries. At one moment it deprives them of blood, and then the attention is solicited to observe that they cannot urge forward the venous column; at another they are filled to distension, so that the impulse of the left ventricle is transmitted throughout this limited sphere of circulation, like the stroke of the piston on the injected fluid, and then the physiologist imagines that he has satisfactorily established the justness and simplicity of physical principles, in the explanation of vital phenomena.

The direct influence of the heart is also inferred from observing the effects of depletion and fainting, on saguinolent secretions and hemorrhage. We have already slightly touched upon this subject, but we again recur to it, as the consideration of it properly belongs to this division of the inquiry. Fainting makes a powerful impression upon the course of the blood, almost at once arresting any unnatural discharge. This we should have anticipated from the views which we entertain of the influence of the capillaries, and the phenomenon certainly cannot be adduced as evidence that these vessels do not concur in an important degree in the process of circulation. The analysis of the modifications produced in the motion and distribution of the vital fluid by fainting will exhibit further the difficulties inherent in this branch of investigation.

Fainting, whether caused by mental impressions from objects without, or by depletion, occasions either cessation or imperfect action of the heart. In this case, the blood in the different series of vessels is circumstanced as in the experiment of Magendie, in which the finger is placed upon the artery, and intercepts the impulse of the left ventricle. It passes from the arteries into the capillaries and veins, and as it cannot escape, it accumulates in these vessels. It cannot flow in the direction of the right side of the heart, the right auricle and ventricle being at rest, nor is it in any degree influenced by respiration and the muscular actions of the body.

Fainting produces five remarkable effects :—

1. The blood leaves the larger arteries, and accumulates in the capillary and venous systems.
2. The blood is as strictly confined within these two systems as if a ligature were passed around the *vena cava.*
3. The capillaries and veins are not at all influenced by the movements of respiration.
4. The arteries are incapacitated from acting, receiving no regular supply of blood from the heart.
5. The blood becomes less stimulating or oxygenated in its qualities.

It may possibly be urged against these conclusions, that fainting usually continues too short a time to cause such effects. A little consideration of the subject will show, that there is no force whatever in this objection. The whole mass of the blood is supposed to circulate once every three minutes throughout the body, and, therefore, if the action of the heart is arrested or seriously enfeebled for half this time, the ordinary relations between the circulatory systems are disturbed. The arterial will have lost the greater part of its contents, and the capillary and the venous systems will have gained in such proportion. Both the loss and the gain are incompatible with the steady performance of the functions of life. This change in the distribution of the blood is inevitable whenever the heart is either partially or wholly interrupted in its action. Were there no facts which established the inference, reasoning alone on the known properties of the series of vessels, on their relations to each other, on the large capacity of the veins, on the dependence of the vital fluid upon the primary propelling power, would satisfy the most sceptical of the soundness of the conclusion.

The blood is in motion at the moment that the heart begins to flutter in its action, and when this ceases, it trickles forward in the direction of the capillaries and veins, and in these necessarily accumulates. The pulse then is no longer felt, and on the return of sensibility, it is small, weak, and hesitating in its character. The interruption of the circulation proportionately deranges the chemical changes in the lungs, rendering the blood less stimulating.

This inquiry into the modifications of the moving powers of the blood, under these circumstances, is essential, in order that a correct view may be presented of the nature of the objections to prevailing doctrines, as well as of the grounds on which our own rest. The stoppage of hemorrhage on the occurrence of fainting is a fact, and, though contemporaneous with the weakened or interrupted action of the heart, and, in a general sense, consequent upon it, the effect does not prove, and yet it is alleged in evidence of the fact, that the capillaries are inoperative in the process of circulation, or that the heart is the sole moving power of the blood in the veins. Neither influence naturally flows from the phenomenon. Analysis will show, that the physiologist has seized a general result, and has at once referred it to a remote and obvious primary cause, but has overleaped the consideration of intermediate agencies, which are links in the series of antecedents and consequents, associated in the production of a manifest effect—the cessation of hemorrhage.

The argument which is advanced to prove that the capillaries exercise no influence on the motion of blood, would also establish that neither the arteries nor respiration in the slightest degree affect it, because they are not in action. As the arteries, respiration, and the alternate dilatations of the right auricle, are admitted to play an important part in the process of circulation, with what strictness of philosophical reasoning can it be asserted, when these powers are at rest, that the cessation of hemorrhage, on the occurrence of fainting, proves the capillaries to be inoperative in the ordinary conditions of the animal system, or that the venous column is directly moved by the heart? The inference is not warranted by the phenomenon. All the powers which co-operate in the circulation are arrested; and how a general cessation of them establishes the capillaries to be destitute of all influence, or the heart to be the sole cause of venous circulation, we leave to others to determine. The capillaries and the veins are in a state of distension. The former are not in a condition to contract upon their contents, and if they were, the large venous columns in advance of them, at rest, would be a barrier to their action which they could not overcome.

Other experiments have been instituted, to determine the influence of the heart on capillary circulation, such as the excision of this organ—the passing a ligature round the aorta, or crushing the brain, the capillaries at the same time being examined in a transparent membrane, placed in the field of the microscope. The objection to all such experiments is the same as has already been offered to those of Magendie. It is not possible by such means to arrive at accurate results. If the heart be removed, or the aorta tied to intercept its action, the natural relations between different motory powers are at once destroyed. The arteries ceasing to receive blood cannot exercise any influence on its motion, nor can the fluid be transmitted regularly to the capillaries; so that the phenomena observed in these vessels cannot convey a correct idea of their functions. Suppose it to be admitted that capillary circulation did not continue long in any of these experiments, the inference that this was attributable to the non-co-operation of the heart would not be a just deduction. The arteries and capillaries cannot be expected to exercise their functions unless supplied with blood. In these experiments, a continued current is furnished to neither. Were the blood, after excision of the heart, or tying of the aorta, accumulated in the larger arteries, it would be fair to ascribe such effect to the want of a propulsive power *a-tergo*. But what is the fact? not that any accumulation takes place in these vessels, but indeed in the veins, so that the blood after such operation traverses the capillaries.

The circulation in the capillaries is readily detected by the microscope, and is stated to continue many minutes after the excision of the heart. "Excision of the heart," says Spallanzani, "suspended the circulation in the whole system of the arterial vessels. It was different in the veins. The blood of the pulmonary vein and its ramifications continued its course for seventeen minutes; but it was much less rapid than formerly." Many experiments are detailed in corroboration of this fact. Muller, who considers the motion of the blood in the capillaries wholly dependent on the heart, acknowledges, that "for a few minutes after separating the foot of a frog from the body, he could still perceive the motion of the blood from the minute vessels towards the larger, that is to say, towards the openings of the divided stems." "Baumgaertner observed the blood in the frog's foot continue in motion from three to five minutes, after ligature of the artery." Wilson Philip says, that "when a frog is decapitated without much loss of blood, and then a ligature thrown round all the vessels attached to the heart, on the web of one of the hind legs being brought before the microscope, the circulation in it is found to be vigorous, and will continue so many minutes; at length gradually becoming more languid."

It is evident, after the preceding remarks, that the excision of the heart or tying the aorta, cannot possibly lead to any just views on the circulation. To disturb or destroy any of the powers engaged in the process will necessarily defeat every attempt to calculate the respective influences employed. The experiments tend to prove that the capillaries exercise a propulsive power. In our further investigations we shall endeavour to determine more accurately the properties of these vessels, and the manner in which the circulation of blood is affected by them.

INQUIRY III. *The properties of Capillaries as determined by experiment.*

The larger arteries are admitted, by one class of physiologists, to possess elasticity and contractility. By another, the existence of the latter property is denied. It has, however, in our opinion, been placed beyond doubt by the experiments of Verschuir, Parry, Hastings, Thomson, Hunter, Bikker, Home, and others. The contractility of capillaries is shown by the application of different substances to delicate lining membranes, accelerating or retarding the circulation, according to the stimulating or sedative properties of the agent. Light, heat, and mechanical irritation also modify it. Such effects have been so frequently observed, and the conclusions to which they lead are so strongly corroborated by the greater or less facility with which different fluids are perceived to pass through them, by injection, as well as the modifications they undergo in disease, that it is to us inexplicable that distinguished modern physiologists should contend that the capillaries are entirely destitute of contractility. "In vain we seek for evidence of a power to contract and propel the blood in any of these phenomena of the true capillary vessels." Muller, in a passage previously quoted, admits the motion of blood in the foot of a frog separated from the body, but refers it "to the tendency of the blood to escape from the divided vessels, which, by their elasticity, assume a less diameter than they had before in a state of forcible extension. The narrowing of the vessels can, in fact, be perceived by the aid of the microscope. If the divided surface from which the blood flows is elevated, together with the leg of the frog, the escape of the blood ceases sooner, and after five or six minutes, not the slightest motion is perceptible in the capillary vessels." Wedemeyer, who denies that the circulation is aided by the capillaries, nevertheless admits that, on the application of galvanism to them, "a remarkable retardation of the current of blood was produced, amounting in no long time to complete stoppage and coagulation." These effects, however, he refers not to a power of contraction in the capillaries, but to "the influence of galvanism on the nerves, and, through them, on the blood." To explain other phenomena, such as the circulation being carried on in some of the lower animals destitute of a central organ of propulsion, and in imperfectly constituted fœtuses, in which there is no heart,—for the flushed appearance of the countenance under the influence of passion, and for the arteries being found empty after death, he maintains, "we must assume the existence of a vital attractive force in the tissues, a power by which the blood is drawn towards them, and which is regulated, as to its energy, by the nervous system." The human mind too often overlooks obvious and efficient causes, seduced by speculative views, which, in the progress of science, can never attain to the distinction of established truths. Another authority in investigating this subject remarks, "Weak volatile alkali or ammonia was applied in the same manner as spirits of wine and tincture of opium had been, and I had now the pleasure to observe a distinct, and in many instances, a complete contraction produced in the arteries to which it was more immediately applied. In upwards of one hundred experiments, in performing some of which I had the assistance of my friend Dr Gordon, the contraction produced took place in less than two minutes after the application of the ammonia. In thirteen similar experiments, the contraction did not take place till after a period of three minutes. In three or four instances only, in which the ammonia was applied to the arteries of fresh frogs, were the contractions not induced ; a proportion of failures surprisingly small, when contrasted with the number of times in which the appropriate mechanical and chemical stimuli are know to fail, in exciting distinct contraction in the larger arteries of warm-blooded animals. The observations and experiments which I have just related, prove undeniably, I conceive, the existence of irritability in the smaller or capillary arteries of cold-blooded animals, and, consequently, the possibility of irregular distribution of the blood in the particular parts of the body being produced, independently of the heart, by the vital, contractile, or irritable power inherent in even the minutest branches of the arterial system."* Hastings, in pursuing similar investigations, observes,—"it now only remains to point out the conclusions concerning the vital contractility of these vessels, which the facts obviously lead to. It appears that the application of a stimulus often quickens the circulation in the smaller vessels, whilst the motion of the blood, in a neighbouring part, to which no stimulus is applied, remains unaffected."† The study of these facts can scarcely fail to convince the unprejudiced that the capillaries are endowed with contractility. Every step in these inquiries will lend additional force to this opinion. At present we are only upon the threshold of the question.

Another species of evidence corroborative of this argument is derived from the greater or less facility with which different injections are made to flow through capillaries. Had they no power of contractility, or were they incapable of influencing the current conveyed to them, would it be reasonable to anticipate that one class of fluids would be quickly arrested, whilst another was allowed an easy and uninterrupted course, which is a fact established by repeated experiments and admitted by all authorities? Hales, in his interesting and ably conducted researches, shows that a column of warm water, pressing on the aorta, will flow freely through such vessels, whilst one of cold contracts them and passes with difficulty, requiring a longer period for its transmission. The same occurs with brandy and astringents generally. These experiments have been recently repeated, and with the same results, by Wedemeyer, who regards the capillaries as facilitating in no degree the motion of blood.

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* Lectures on Inflammation, by Professor Thomson, page 83

† A Treatise on Inflammation of the Mucous Membrane of the Lungs, page 59.

Such experiments show the capillaries to be endowed with vital properties. It may perhaps be urged that they throw no light on the manner in which they co-operate in the circulation. This is at once granted. They establish, however, the presence and operation of a power of contractility. The occasion which brings it into prominent notice is unnatural, but this is no just cause to deny either its existence or its agency. It is indeed amusing to see with what ingenuity writers avoid the admission of such a power in contemplating the phenomena which are evolved by its influence. By one it is remarked, that "many substances, such as those called astringents, for example alum, seem to have the property of producing an approximation to the molecules of living animal matter, a condensation of the matter, and thus a contraction of the tissues which it forms. It is to this effect on the capillaries and small arteries that we must attribute the action of such astringents, and of cold, in arresting hemorrhage from wounds."* How peculiar is this language! Astringents have the property of producing an approximation of living animal matter, and all to avoid the simple expression or term contractility. It is contended, that, supposing the capillaries possessed of this property, it cannot be shown to facilitate the motion of blood, but, on the contrary, will be as likely to retard as to accelerate it. Such reason does not rest on fact, but is deduced from the consideration, that the contractions of the capillaries are not perceived to be successive, as those of the heart, by which alone it is imagined the molecules of blood can be propelled. We do not presume to explain how these vessels modify the course of the vital fluid. This is a matter which cannot be determined satisfactorily by experiment, nor elucidated by the microscope. Physiologists have repeatedly shown that capillary circulation does not cease instantaneously with the removal of the heart, or the passing a ligature round the aorta. That it should not be observed long in a vigorous state, under such circumstances, is not extraordinary. How energetic soever the contractile properties by which they are endowed, these cannot act without the usual supply of blood. To intercept the supply, and then to point to the result as evidence that the heart is the only motive power, displays a limited acquaintance with the complicated relations associating in harmonious action, different parts of the circulatory system.

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* Elements of Physiology, by J. Müller, M. D., translated from the German, by William Baly, Esq. Part i. page 226.

All such experiments are exceedingly defective, nor is it possible to devise any free from insuperable objections, when the adoption of them contemplates the destruction or mutilation of important organs, or in the performance of which the animal is tortured, or placed in a constrained position. The changes or modifications induced by these circumstances are a wide departure from what is natural, and it is as difficult to guard against the deviation as to estimate it. But what force is there in the assertion, that the capillaries, were they to contract, would be as likely to send the blood in a retrograde as in a progressive course? Behind or on the side of the left ventricle, there is a *vis a-tergo*, by which the blood is propelled into the arteries, not even excepting the minute canals which give immediate origin to the capillaries. Before, or in the direction of the larger veins, there is a gradually increasing capacity in the vessels individually, into which the capillaries pour their contents. These two conditions are quite sufficient to explain the reason why the contractions of these vessels will urge the fluid in one direction in preference to another. It must also be kept in mind, that the blood in capillaries is not observed to flow at times corresponding with the systole of the left ventricle, but in a continuous stream, if that can be called a stream when two or three globules a-breast are described as jostling against each other in their circuitous passages to the veins. The motion of blood is slow and equable in the capillary and venous systems. This is admitted by those who contend that the circulation in both is wholly dependent on the heart.

It is astonishing with what stubborn opposition physiologists persist against any influence being assigned, in the circulation, to the capillaries. The results of every experiment, apparently establishing the fact, are evaded by sophistry, or met by objections, which, if they rested on phenomena accurately observed, would in no degree weaken the general fact, the continuance of the circulation; nor afford a satisfactory solution of the difficulties in which the subject is involved. In evidence of the laboured attempts to explain obvious phenomena by hypothesis, and hypothesis of the most insufficient character, rather than admit the natural action of the capillaries, we solicit attention to the following remarks.

"Baumgaertner observed the blood in the frog's foot continue in motion from three to five minutes after ligature of the artery, and attributed the motion to a reciprocal action exerted between the nerves and blood; it most probably arose from the contraction of vessels which had previously been distended; anastomoses also might give rise to such appearances. The ingenious experiments of Baumgaertner unfortunately do not clearly prove what they are intended to do. Moreover, according to my observation, the circulation in the capillaries generally ceases very quickly on the compression of the artery of the limb, when the spontaneous motion of the red particles ought certainly to be seen, if it exists at all. Having destroyed the vitality of the heart of a frog by the application of *liquor kali caustici*, I could by means of the microscope, for some time perceive motion of the blood in the capillary vessels, but it depended probably on the compression of the blood by the elastic coat of the arteries which had previously been in a state of forcible distension."*

The continuance of the circulation for nearly five minutes after the ligature had been applied to the artery, is admitted by the writer, and the same result is observed in his own experiment. The fact is important; and, certainly, the most natural mode to account for it is, to refer it to the ordinary contractile powers of the capillaries. What other powers can possibly exercise any influence under such circumstances? No other powers existing, he remarks, " it most probably arose from the contraction of vessels which had previously been distended; anastomoses, also, might give rise to such appearances."

The distension of the vessels is altogether assumed in the reasoning, and is not likely either to precede or accompany the experiment. The artery only being tied, the capillaries would cease to receive blood, but they would gradually convey what they possessed into the veins, and hence their distension at this time would not be a very probable occurrence. But we will give the physiologist the benefit of the admission, and examine how such a condition can possibly explain the continuance of the circulation.

The distension or congestion of vessels is always unfavourable to their action. It retards and never accelerates the motion of blood. It oppresses rather than invigorates the functions of the capillaries.

According to the reasoning of Müller, to enable these vessels to act, it is only necessary to produce distension; and then the motion of the blood will continue for a considerable period independently of the influence of the heart. If the capillaries, in a state of distension, can maintain the circulation for five minutes, when not at all influenced by any force or supply *a tergo*, the fact undeniably establishes the contractility and action of these vessels. If not endowed with contractile properties, no occasion would bring them into operation. The occasion in this, and in all similar circumstances, excites existing powers, and does not create them. Is it not the extreme of absurdity to argue, that the capillaries, when in a state of distension, can carry on the circulation, and, at the same time, to deny that they are endowed with the properties of contractility, or exercise an important part in the motion of blood? Even, agreeably to the views of the physiologist, the distension is not the cause of the continued circulation, but only the occasion which brings into play the natural properties of the vessels. He imagines the effect to be produced by elasticity, but this never gives origin to motion, nor maintains fluids in circulation when the cause which evolves the operation of the property ceases to act. The impulse which the elasticity of a vessel impresses upon a fluid is derived from, and proportionate to, the cause by which the vessel was distended. Continued motion from elasticity alone is an impossibility. In the case under consideration, elasticity would not produce a series of contractions. According to the most liberal interpretation of which the property admits, this would cease to act the moment the distension was relieved, and how could this continue, when the ligature interrupted the impulse of the left ventricle, and cut off the current essential to maintain it? Such is the value of the objections urged by a distinguished physiologist against the influence of capillaries on the motion of blood. In the first place, he assumes the distension of the vessels, and in the next, without condescending to explain how it can produce the effect, reasons upon it as a clear and admitted fact.

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* Elements of Physiology, by J. Müller, M. D. Part i. page 223.

Anastomoses, it is urged, might possibly give rise to the appearances of capillary circulation. If arteries not included in the ligature afforded both an impulse and a supply of blood to the capillaries, which is the inference, what should prevent the longer continuance of the circulation? In his own experiment, no such cause could exist, for the vitality of the heart was destroyed, and yet the circulation was not interrupted in the capillaries. Here, then, is a fact, the continuance of capillary circulation, and the crude hypothesis of the physiologist reposing on an assumed condition, and one inadequate to the explanation of the phenomena.

It is stated that, if the circulation be impeded, a "pulsatory movement at each systole of the left ventricle becomes very manifest." This and other phenomena may be shown to originate in causes which have disturbed the relations of the several powers engaged in the process of circulation. An impediment to the regular course of the blood, in any of the three classes of vessels, almost invariably produces congestion of the capillaries; and such impediment is created in all experiments, which either mutilate or cramp the organ examined, or which torture the animal, either from the means employed, or the constrained position in which it is placed. An obstacle to the free passage of venous blood is equally an obstacle to the contents of the capillaries and arteries; and the moment it occurs, a continuous column is formed, extending from the obstacle to the left ventricle, the contractions of which communicate an impulse throughout the several series of vessels. The pulsatory movement in the capillaries and veins, synchronous with this contraction, is observed only under such circumstances, and is indisputable evidence that the natural relations of the vessels to each other and to the heart are disturbed; and hence the phenomena afford no illustration of the powers engaged in the process of circulation.

A writer of considerable industry, and who does not allow that the capillaries facilitate the motion of blood, confirms from actual observation the truth of our remarks; and his own experiments may be adduced as exhibiting, to a painful extent, a wide departure from just principles of investigation.

" If the circulation be, on the other hand, in the slightest degree impeded, the pulsatory movement, at each systole of the heart, becomes very manifest. It is seen in all the three systems of vessels, arterial, capillary, and venous. In the arteries there is generally an alternate more and less rapid flow of the globules, at each systole and diastole of the heart; in the capillaries and veins, the blood is often completely arrested during the diastole, and again propelled by a pulsatory movement during the systole of that organ. In other cases, a pulsatory movement is seen in the arteries only, the blood in the capillaries and veins moving slowly but equably.

" The experiment is made in the easiest manner. A ligature being applied in the gentlest way round the limb of the frog, the circulation is immediately impeded in the web, so as to render the phenomena which I have described quite apparent. The pulsatory, and the retarded or arrested movements of the globules of blood may be varied, in an infinite manner, by diminishing or increasing the degree of tightness of the ligature."

From this and similar experiments he concludes:

" It may now be asked, what presumption is there of muscular contractile power or irritability in the true capillaries?

" The flow of blood through the capillaries appears, in every instance, to be effected and modified by powers impressed upon it, of a character extraneous to any action of these vessels themselves.

" The influence of the contraction of the heart is quite obvious upon the motion of the blood in the capillary vessels, as I have already stated.

" Not less is the various influence of the struggles of the animal in retarding or arresting the flow of blood in these vessels, or rendering it retrograde.

" Any cause of contraction in the membranes forming the web itself has also a remarkable influence upon the course of the blood in the veins and capillaries.

" In vain we seek for evidence of a power to contract and propel the blood in any of these phenomena of the true capillary vessels. Where, then, is such evidence to be found?"*

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* Critical and Experimental Essay on the Circulation of the Blood, by Marshall Hall, M. D. F. R. S. E., M. R. I., M. Z. S., &c. &c.

To avoid unnecessary repetition and detail, we shall restrict the analysis to this and the following experiment, and the accompanying reasoning, as the objections apply almost with equal force to the numerous experiments performed to elucidate capillary circulation.

The experiment is to determine how far the action of the heart extends, or, in fact, what powers are engaged in the process of circulation, and the first step which he takes, is to apply a ligature to the limb of a frog, which of course at once interrupts the passage of the blood flowing in the direction of the web, and prevents equally the return of it from the veins. This experiment, therefore, clearly annihilates the influence of the contractility of the arteries, and of every power, whether it act behind or in advance of the venous column.

It is indeed remarkable that this physiologist should not have been sensible of the unnatural conditions which the experiment inevitably produces; because, according to his views, "the arteries are, indeed, a second heart, in an elongated form. Their function appears to be so perfectly performed in health, that all visible pulsation from their action is lost at their extreme branches. The blood is carried along at last, by such gentle undulations, caught in their full force from the heart, but softened first by the elasticity, and then by the contraction of successive portions of the arteries, that its flow seems to become uniform."* When the ligature is passed round the limb of the frog, the arteries manifestly cannot execute this function, receiving no blood. Having cut off this supply, all important, on his own views, and preventing the contents of the veins from escaping, he then examines the phenomena of capillary circulation. He observes that the globules seem to forget to march directly forward, indeed, in their astonishment, they move in all directions, and occasionally are at rest, as if reflecting what course to take, being most peculiarly circumstanced. On one side, they have lost the assistance of the heart and arteries, and the aid of fresh streams of blood to stimulate them; on the other, the veins are incapable of transmitting forward what the capillaries have conveyed. Their situation is one of great peculiarity, and yet the experimentalist, altogether insensible of it, reasons upon the phenomena evolved, as if nature had allowed him to analyze her operations, when all her delicate and mysterious influences are at work. It is not possible to imagine an experiment that deviates, in its conception and execution, more widely from the just principles of philosophy, the sound rules of enlarged and vigorous common sense. Where are the globules to march to, when an obstacle is interposed to prevent their escape; or how is the action of the capillaries to be determined, when deprived of the means essential to excite and maintain it? He remarks, that "the pulsatory and the retarded, or arrested, movements of the globules of blood may be varied, in an infinite manner, by diminishing or increasing the degree of tightness of the ligature." Unquestionably. To modify the tightness of the ligature, is to modify the current of blood transmitted to the capillaries, and of course to change, with every such modification, the phenomena of capillary circulation. But with what propriety can these phenomena be adduced as evidence of the natural influence of the heart, of the arteries, and of the capillaries, conjointly, or of each singly, on the motion of the blood?

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* Opus cit. page 85.

The same objections apply to all such experiments, whether the brain be crushed, the spinal cord destroyed, the heart removed, the aorta tied, or the animal tortured by the procedure adopted. In all these cases the natural relations uniting in harmonious action the several powers, maintaining and regulating the circulation, are destroyed.

In further illustration of the serious objections to experiments in which organs are mutilated, and conditions induced widely different from those which are natural to the system, we shall introduce one other experiment from the same authority.

"A ligature was applied round the aorta of a frog. The circulation in the web, which was previously very vigorous, was almost immediately arrested, first in the capillaries, then in the veins. In the arteries there was a singular oscillatory movement of the blood for ten or fifteen minutes. The globules of blood proceeded slowly onward for some seconds; there was then, all at once, a rapid retrograde movement of the blood, apparently through the same space. This oscillation was repeated; the globules of blood were again moved alternately in progressive and retrograde directions as before.

"It appeared to me that the artery gradually contracted, in successive portions, and slowly emptied itself by propelling the blood in a continued stream along its final branches; that it then dilated suddenly, and drew the globules of blood in a rapid retrograde course."

In the subsequent consideration of this experiment, he remarks:

"After the power of the heart is thus excluded, what do we observe? A peculiar, slow oscillatory movement of the blood in the arteries, whilst that in the capillaries and veins is motionless."

"If the capillaries and veins have the same power of irritability as the arteries, why do we not observe the same phenomenon in them as in the arteries?

"If the capillaries possess a muscular power, why is the blood all at once motionless in them, when the power of the heart is excluded? Must it not rather be inferred, that, as the blood contained in these vessels is without motion, the vessels themselves are without automatic power?"

The changes in the conditions of the circulatory powers are the same in character, whether a ligature be passed round the limb of the frog, the heart be removed, or the aorta tied. The experiments differ only in the amount of the disturbance induced. The reasoning which applies to the one is strictly applicable to the other. When the ligature is passed round the limb, the parts beneath it neither receive blood nor expel what they possess. When the heart is removed, there is at once an interruption to the supply. The circuit is broken, by which alone the supply and onward movement of the fluid can be regularly maintained. When the aorta is tied, the circuit is broken, as effectually as if the heart were removed. In this case, the supply essential to the action of the arteries and the capillaries is cut off, and the veins cannot possibly convey forward the fluid transmitted to them, for to tie the aorta is to place a barrier to its escape.

In the experiment in question, the application of the ligature, as already remarked, would force the blood in the direction of the capillaries, independently of all contractility in the aorta; and being in motion, antecedently to the application of the ligature, it is manifest that, if the artery exerts a propelling power, the blood at this moment is pursuing its course, in consequence of the impulses previously imparted to it by the heart, the sudden tightening of the artery by the ligature, and the contractile properties with which the vessel is endowed. The influence of the two first causes is indisputable, and if to these be added, the contractility of the artery, the subject becomes exceedingly complicated and difficult. To determine how much of the effect, the forward movement of the blood, depends on each, and the discrimination must be made, or the reasoning will rest on assumptions, is impossible in the existing state of physiology.

The gradually diminishing capacity of the artery, or its seeming contractility during the experiment, is no evidence that the contents are expelled by its action. The calibre lessens with the escape of the blood, but the escape is no proof of the existence of contractility. The effect cannot be thus simply traced to its cause, and yet such is the reasoning of the writer in question, and of physiologists generally.

The former states, in explanation of the experiment, that the artery propelled the blood by its contraction; and subsequently, by its dilatation, " drew the globules of the blood in a rapid retrograde course." It is not philosophical to speak of the dilatation of an artery drawing the blood. This will flow where it meets with the least resistance, but it must already be in motion, or be acted upon by some cause, independently of the dilatation, or possess within itself the principle of mobility, to take one direction in preference to another. The dilatation of the artery will not create the motion. The experiment in no degree elucidates the functions of the vessels of circulation. It throws no light whatever upon the influence of the capillaries. It cuts off the stream from behind, and places a column of venous blood, in advance of them, at rest.

The conception of the experiment and the arguments with which it is accompanied, show how little attention the relations of the moving forces of the blood have received from minds of a superior order, familiar with scientific investigations, and rich in the occasions necessary to conduct them with success.

In further illustration of the importance of maintaining, in experimental researches, the natural relations of the moving powers of the blood, and of the gross oversights of physiologists in their investigations; we allude to a difference in the condition of capillary circulation, when the blood is enabled to escape from divided vessels; and when the transparent membrane examined is exposed to the rays of the sun.

In regard to both circumstances, it is remarked, "There are two conditions under which the blood in the capillaries of a transparent part separated from the body may still be seen in motion by means of the microscope.—1. As long as the blood continues to flow from the divided vessels. Thus, for ten minutes after separating the foot of a frog from the body, I could still perceive motion in the blood from the minute vessels towards the larger; that is to say, towards the openings of the divided stems. These movements, in my opinion, depend simply on the escape of the blood from the divided vessels, which, by their elasticity, contract to a less diameter than they had before while in the state of forcible extension. 2. The condition under which the motions are perceptible is, when the rays of the sun are allowed to fall on a moist part separated from the body. The surface of the part then becomes dry and wrinkled so quickly, that the change is perceptible to the eye."* In the analysis of the experiments on capillary circulation, two objections have been particularly dwelt upon, as invalidating the conclusions, viz. the stoppage of the current from behind, and the interruption to the escape of the contents of the capillaries; and both effects are produced when the heart is removed, the aorta tied, or a ligature passed round the limb. The experiment in which the vessels are divided induces an important modification, and destroys one of the objections. The capillaries cannot receive a current to invigorate them, but they are enabled by the divided vessels to transmit forward their contents, and all authorities agree, that capillary circulation is carried on with considerable vigour under such circumstances.

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* Muller, Opus cit. Part. i. page 223.

The physiologist ascribes the movements to "the escape of the blood from the divided vessels, which, by their elasticity, contract to a less diameter than they had before, while in the state of forcible extension." From his own arguments strange conclusions may be drawn. The escape of blood is alleged as the reason for its motion, elasticity diminishing the diameter of the vessels. Therefore, in experiments in which the vessels are not divided to allow of such escape, by which either elasticity or contractility may be enabled to operate, with what philosophical propriety can the physiologist contend that these vessels are incapable of propelling the blood? He admits the power, when the occasion is favourable for their action, no obstacles existing in advance of them; but denies it, when the vital fluid by which they are stimulated has no means of escape.

If the divided vessels promoted circulation simply by relieving extension, the circulation would be arrested the moment the capillaries had passed forward a portion of their contents; it is observed, however, for ten minutes, during which time they are furnished by no streamlets from behind, with the means of continued contraction.

Again, the circulation is excited when the direct rays of the sun fall upon the vessels. The same effect occurs when various stimulating agents are applied, and the heat of the sun may be regarded as acting in the same manner.

The justness of our remarks on the imperfections of all experiments, instituted to elucidate the functions of the capillaries, is fully established by the difference in the results occasioned by divided vessels. The analysis has constantly presented to the mind two objections, an obstacle in advance of the capillaries, and an interruption to the supply from behind. In the experiment in which vessels are divided, one of these objections is removed, and hence the manifestation of circulation, and the continuance of it as long as the capillaries can be supposed to possess any fluid to excite them.

Sensible that all such experiments are fraught with insuperable difficulties, and throw no positive light on the functions of the capillaries, the consideration has been to devise some method by which the fact of their operation might be satisfactorily established, an experiment, indeed, in which the properties and relations of the vessels examined should not be seriously affected, nor the appreciation of the phenomena require the aid of a powerful lens. An organ quickly presented itself to the mind, as peculiarly adapted to the inquiry, viz. the placenta. The whole substance of it may be regarded as composed of arteries, veins, and capillaries, and although the disengagement of it from the uterus disturbs the normal relations of these vessels, it appeared, nevertheless, capable of furnishing results bearing upon the subject of investigation. Nor was it necessary, as a preliminary step, to determine the nature of the connection between the placenta and the uterus. Whether direct or indirect, is of little importance to the simple experiment we propose to make.

The umbilical vein conveys arterial blood from the placenta to the fœtus, the umbilical arteries convey venous blood from the fœtus to this organ. The origin and termination of these two classes of vessels in the placenta are involved in much obscurity. No direct connection is traced between them. Whatever opinions may be held respecting the functions of this organ, or its relation to the uterus, it will scarcely be doubted that the vein terminates in capillaries, and that the arteries originate in the same kind of vessels. It is not our intention to examine the phenomena of fœtal circulation, but to allude only to one striking peculiarity, viz. the circulation of blood in the umbilical vein. This fluid is transmitted from the placenta to the fœtus without the aid of any propulsive organ. The capillaries are indeed the only sources of motive power shown to exist, and hence, the placenta, separated from the uterus, appeared capable of determining the influence of capillaries, and the efficiency of it in urging the blood through the long capacious vein. To institute the experiment, a placenta was procured, twenty minutes after separation from the uterus, and placed, with the exception of the cord, in a bladder, which was immersed in water, at the temperature of 100° Fahrenheit. The free extremity of the cord at the same moment was elevated to an angle of 30° resting on the edge of a glass, and at the distance of a foot from the placenta. At the commencement of the experiment no blood escaped from the vein, but in two minutes from the immersion, it began to flow, and continued for about twenty minutes, and at this time, it was found that the glass had received above one ounce.

Here then is an experiment, much less exceptionable in its character, than any with which we are acquainted, demonstrating the power of the capillaries to carry on the circulation, not only in their own complicated net-work of vessels, but in larger vessels, and which ultimately terminate in a capacious vein; and the difficulty to the motion of the blood was intentionally increased, by the elevation of the whole cord above the level of the placenta. Had this organ been immersed, without the bladder, the absorption or imbibition of the water would have invalidated the experiment. The water is employed as an external stimulant for the purpose of maintaining, what may be conceived to be, the natural temperature of the placenta.

The flow of the blood in this experiment, in our opinion, arises entirely from the influence of the capillaries. The stimulus of the water causes the blood to excite them to contraction, and the escape of it is not opposed by any impediment. We cannot imagine that the experiment produces any important modification in the conditions of the blood. The water is not absorbed, nor is the temperature of it elevated above the heat of the body. The consideration of the circulation in this case is not complicated by circumstances acting *a-tergo*, or in advance of the blood; nor by the agency of respiration, or the struggles of an animal in torture, or placed in a constrained position.

Whether the results be regarded as satisfactory or not, the experiment is manifestly free from many objections, which apply to the labours of others in the same field of physiological research.

ART. III.—*Practical Observations on the Diseases of Peru, described as they occur on the Coast and in the Sierra.* By ARCHIBALD SMITH, M. D. (Continued from Vol. lvii. p. 369.)

III.—DISEASES OF THE INTERMEDIARY VALLEYS OF PERU.

The temperate valleys of the upland country or Sierra of Peru, such as the localities of Tarma and Canta, to which the practitioner in Lima so frequently sends his convalescents and phthisical patients, partake, though in a milder degree, of the diseases prevalent on the higher table-land and cold pasture grounds.

It is not, therefore, in such temperate recesses among the mountains that the diseases are usually produced of which we are about to take notice under the head of Diseases of the Intermediary Valleys, but in the deep warm glens of the interior, where the plantain ripens in the genial sun, and the *palta* and *chirimoya* are seen to mellow in their native soil between the Eastern and Western Cordillera, or Cordillera and headland glens of the coast.

A peculiar advantage possessed by those who reside in the deep ravines and dry warm climates of the inland country is, that the diseases arising in these localities have their cure surprisingly facilitated by transporting those affected with them to the cool acclivity of one of the overhanging hills—a salutary change of place, which may often be effected in one hour's time; and, on the other hand, should the character of any particular disease be such as proceeds from the chill air of the surrounding heights, or one to which cold is felt to be hostile, in still less time than required for the ascent, the invalid may descend from his residence on the mountain side, to the town or village and cheerful groves in the evergreen valley beneath. These facts are practically known to the agricultural Indians of warm valleys, into the bottom of which the inhabitant of the lofty hamlet comes to seek relief from his rheumatic pains, by sweating freely in the labour of the cane-field; and the ordinary labourers on these lower plains find it particularly beneficial to reach the cool of the heights when they meet with bad wounds or contusions, to which those who feed the sugar mills or "trapiches" are always exposed in their perilous work.*

The greatest confidence in the sanatory effects of natural variations in the temperature of contiguous localities, every muleteer or ploughman in these districts gives daily proof of, for he invariably sends the sore-backed mule, or broken-horned ox to the mountain springs and pastures, to be there spontaneously and speedily cured of wounds which, in warm and low situations, would be the prolific nursery of worms, and, therefore, either prove fatal, (as often happens in the case of the ox,) or, if not, very hard to heal.

We may here remark, that persons who, in warm districts, where the air is mild, the sky serene, and vegetation flourishing, lie out much in the open fields unprotected from the insects that swarm around them, are liable to have maggots generated in their nostrils or frontal sinuses; and the same accident sometimes happens on the coast as well as in the interior. In such cases the natives apply the fragrant herb *albaca*, or *sweet basil*, to the nostrils, which is said to act as a poison to the worms, and to make these very hostile inmates speedily turn out from their lurking-places.

There are few, I think, who have had frequent occasion to descend from the elevated mountain ranges to the very warm inland glens, who have not had opportunity to observe a remarkable connection betwixt the action of external heat and the derangement or increased activity of the biliary organs. These rapid transitions from a cold to a warm climate are often medicinal in their results, but a smart attack of bilious diarrhœa is not the unfrequent consequence, especially to those who exercise no degree of self-denial when tempted to indulge too freely in eating succulent fruits, as they see them hang invitingly on the spreading boughs that cast their grateful shade on the highway.

When anybody, for some time inured to the rigorous climate of the high and well-known mines of Cerro Pasco, finds himself, after two days ride, in the vale of Huanuco, he is delighted with the beautiful mornings and smiling aspect of the place, and is invited to walk in its fruitful orchards and among lanes shaded with the *pacay* and *guayava*, and hedged in by fences of the Indian fig and *maguey*. If, on a visit of recreation to Huanuco, any one not accustomed to the climate should be enticed, with gun in hand, to follow the flocks of doves, that are there very numerous, from field to field, and from grove to grove, until he become overheated, and then sit down to refresh himself with fruit and the drink called *guarapo*, under the shade of some hut, the probable consequence of this sportsman's amusement and cooling repast will be a bilious diarrhœa.

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* The peril of feeding these sugar mills is, that, in pressing in the cane and directing it between the rollers, the fingers or hand may be caught and carried in along with the cane, so as to be shockingly bruised or mangled. This accident is very apt to occur when the workman has drunk too much of the fermented cane juice, so as to be intoxicated; and the consequence will probably be the loss of an arm or of life, should the motion of the mill not be instantly stopped.

Bilious Diarrhœa.—In severe cases of this disease, where no inordinate bodily agitation, or even irregularity of any kind, could be assigned as the exciting cause, I have witnessed the evacuations very copious, fetid, and of a dark or greyish appearance. Severe cases of this nature, like milder attacks of common diarrhœa, the natives endeavour to cure by mild clysters, panada, arrow root, and other farinaceous articles of diet; while they use, as cooling beverages, tamarind drinks, pineade, lemonade, pomegranate juice in water, with the addition of a little sugar or syrup. In ordinary cases, this treatment answers expectation and relieves the patient, but in severe and protracted cases of biliary diarrhœa, I have given calomel and opium with the best effects. In the early stage of evacuations and fever kept up by hepatic irritation, I conceive that the subtraction of blood from the arm or foot, with a low and cooling regimen, the warm bath, emollient cataplasms to the abdomen, and mild diaphoretic diluents, as a decoction of Scorzonera and mallows, which is a popular beverage among the natives, might serve to lower gastric excitement. And in those cases of bilious diarrhœa in which there is an evident tendency to drowsiness, opium and astringent remedies should be administered with great caution, or not at all; for suddenly to restrain the excessive secretion of bile may occasion very dangerous cephalic results.* Where the head is sympathetically affected in cases of biliary diarrhœa, advantage may be derived from local bleeding and blistering, or the application of sinapisms to the feet, and foot-bath; and, also, by directing all irritating matter from the stomach downwards, with the aid of castor oil or other suitable opening medicine, such as calomel and ipecacuan, or antimonial powder conjoined, which may not only ease the bowels, but further, serve to correct their vitiated secretions, and equalize the circulaticn by promoting the action of the cuticular vessels.

Bilious Fever.—I once experienced in my own person a very severe bilious fever, which arose from my having been exposed to a current of air in a too well-ventilated apartment in Huanuco, where the breeze rushed in quickly through doors and windows, after having been previously overheated, on a sunny day, by climbing from peak to peak of a chain of hills in the vicinity of that city. I was chilled in course of the evening when exposed to a draught of air as described, and at night was seized with vertigo, bilious vomiting, purging, general oppression of body, and uneasiness of mind, accompanied with a feeling of increased duration of time, which converted in idea minutes into hours of painful suffering. Frequent griping, loose scanty motions, anorexia, foul and furred tongue of a whitish or yellowish appearance, insomnolence and considerable fever attended this disorder, of which I could not get rid in Huanuco or the neighbourhood. But, after ten or fourteen days illness, and feeling my strength reducing fast, I was impelled to exertion by a desire of self-preservation, and resolved to seek a cold climate. I therefore got on mule-back, and after two days fatiguing journey, entered Cerro Pasco, where I was laid up for more than a month; but though thus excessively reduced, and considered in a hopeless state, was restored to health by mercurializing the system,—a process which was easily induced, since it was done very effectually in forty-eight hours, and with less than twenty grains of calomel. Notwithstanding the room in which I lay during my illness in Pasco was more comfortable than common in that place, and its temperature moderately kept up by a good coal fire, yet salivation was severe; and with the salivary organs all the exhalants and secreting apparatus of the body seemed to have opened up their sluices at once. My bowels, which for several weeks previously had been in a disordered and irritable state, now obeyed their natural call, and voided figured, regular, and abundant motions, with only the aid of the mildest diluent drinks. Thus, the fever disappeared, and recovery was insured and hastened, by descending eight leagues below the mines, to a mild climate, at the village called Huarriaca, where I was able to take sufficient exercise in the open air. Though fevers of the nature now detailed may occasionally occur in Huanuco, I believe they never do in this favoured locality, so far assume the character of the bilious remittents of the coast, or even some parts of the interior, as to be transmuted into regular intermittents or tercianas.

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* It may be well to observe, that the popular treatment of the natives, in cases of the kind noticed in the text, consists in the use of farinaceous diet, diluents, emollient enemata, and oily or unctuous applications to the abdomen. These oily applications being bad conductors, prevent the excessive radiation of internal, and the too rapid communication of external heat, and therefore keep up an equal temperature, and guard against the effects of atmospherical vicissitudes. It is thus that the natural unctuous exudation of the negro's skin preserves the equal circulation and temperature of his body, otherwise, from its colour, disposed to radiate toofreely.

Tercianas.—One of the most famed localities for terciana in all Peru is in the curacy of Huancabamba, in the province of Huamalies. This curacy or parish is a long glen, which extends from the frigid pastoral ranges called Puna, to the neighbourhood of the Montana. A friend who was for some time curate of this district complained bitterly of the double tercians, *Tercianas dobles* (or two distinct paroxysms within the twenty-four hours), to which he was subjected when he had occasion to visit Guarriganchá at the lower extremity of the glen, and only a few leagues distant from the entrance into the Montana. Guarrigancha abounds in fruit; and it is of all the Quebradas or glens whose waters flow towards the Montana the most terrible for its tercianas.

It is remarkable that, within the limits of the curacy of Huancabamba, in which Guarrigancha is situated, grows in abundance the Peruvian bark of best quality; on which account, in times of the Spanish vice-royalty, when the traffic in bark was a lucrative branch of commerce, this was held to be the most valuable and important doctrina or parish in Peru.

In general, the more distant from the coast that are the valleys of the interior on the western side of the Andes, and the more remote from the humid Montana on the eastern frontier, the less are they the nurseries of terciana. In truth, it is not a disease of the cold table-lands, nor of the temperate districts in which the temperature of the air during the rainy season is only about 60° of Fahrenheit; and I have never witnessed a case of intermittent fever in Cerro Pasco of which the seed was not conveyed from the coast, some warm valley of the interior, or the woodland and missionary range of country between the rivers Apurimac and Great Maranon. In these departments of the interior, where narrow glens with very little strath yield the orange, chirimoya, and other rich fruits, are not rarely seen some sheltered spots which are kept humid by their vicinity to the beds of rivers, and favourable to the growth of malaria. In localities of this description, where the radiation of heat is for half the year at least peculiarly favoured by a clear and cloudless sky, men indulge in the custom of frequently sleeping in the open air; and I am well informed that the inhabitants are observed to be in many instances both sallow-looking and sickly, especially where ague prevails much, as it does in some parts of the province of Conchucos; and in some of the deep "Quebradas" or glens in the neighbourhood of Cusco, where tercianas are known to occur chiefly among labourers in the sugar plantations, who happen to get intoxicated and lie out in the fields until they become sober again. The vale of Huanuco has a daily breeze up the river Huallaga; its air is dry and warm, and carries off the perspiration of the body as fast as it is generated; so that, in this sweet retreat, alike free from ague and consumption, without great exertion or exercise, one does not perspire profusely, or even so as to be very observable. The fields of this valley are more spacious and ample than common, with a soil never so moist but it needs irrigation; and, therefore, it is naturally ill calculated to nourish miasmata, and its ventilation is more free than is usual in many other inland valleys known to yield fruit and produce of the same sort which abounds in Huanuco; yet these other localities are not, like Huanuco, always exempt from terciana.* But what is still more striking is that, in other parts of the Montana, as that which corresponds to Guancayo, Guanta, &c., agues are not unfrequent, though in the Montana of Huanuco, along which rolls the river Huallaga, ague is not known, as an endemic or indigenous disease. I never knew any person in Huanuco return from the *Coca plantations* in its corresponding Montana with primary ague; the only instance of a slight terciana ("terciana boba") caught there in memory of the present generation occurred, as I have been informed on the spot, in the person of the lady of a wealthy and honourable gentleman of the name of Don Jose Espinoza. Should any apparent exception be stated to what is now advanced respecting terciana, I think it will be found that these supposed deviations from the general rule are only relapses or recurrences after former attacks originating in aguish districts; and, as for mere relapses of terciana, they are apt to recur in any one whom this disease has once attacked, from a great variety of occasional causes which never fail to present themselves in every variety of climate and situation from the sea to the snow-clad mountains.

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* In Huanuco, which is about 7000 feet above the level of the sea, the thermometer rarely throughout the whole year rises above 72°, or falls below 66° of Fahrenheit in the shade. But at Rondos, a small hamlet situated on an acclivity above the city of Huanuco, and about 1000 feet perhaps higher than the city, the temperature may be about 10° lower; and here, persons affected with pulmonary consumption experience more relief than in the vale immediately beneath. Indeed, from 8000 to 10,000 feet appears to be a very favourable degree of elevation on the Andes, where the snow-line is at 15,000 or 16,000 feet, for the recovery of those affected with pulmonary complaints. The extreme of cold seems to be as hurtful as the extreme of heat, and too rare an atmosphere as injurious as too dense. Though I did not express this opinion when treating expressly of consumption, yet I am disposed to believe that much of the advantage which is known to arise to those who, when affected with pulmonary consumption, change the climate of Lima and the coast in general, for the Sierra, proceeds from the change which is thus induced in the capacity of the chest, pulmonary tissues, and air-cells. For when youthful patients, especially, are transported from the coast to the Sierra, by gradual stages, as suited to their actual state of weakness and disease, is it not reasonable to think that the pulmonary organs and thoracic cavity will be gradually enlarged, and adapted to the rarer atmosphere of elevated regions, as we find to be the case with the mountain Indians?

Visceral Obstructions.—Chronic hepatitis is a disease which, in common with several other visceral obstructions, is frequently met with in the warm intermediary valleys. It is greatly relieved by a suitable change from the more ardent to a mild and more temperate climate. It is also alleviated by the natural warm baths so common in the country. Mercurials are little resorted to by the natives of the interior, though in such disorders no remedies are so likely to do good if properly administered. Where ague prevails greatly, of course enlargements of the spleen as well as the liver may be looked for; and jaundice, dropsical swellings, &c. are not the unfrequent consequences of such diseased structures.

The uterus and ovaries are sometimes found to be diseased, and greatly increased in bulk; and for the production of diseases of these important organs the same moral causes operate among the white races of the interior, as are known to render similar ailments more prevalent on the coast, where the climate is more relaxing and conducive to constitutional weakness. In a case where a large abdominal tumour presented itself a little above and to the right of the umbilicus, without disordering the bowels, or impairing the appetite, the thirst was insatiable; and the gentleman affected, (who was a corpulent curate of a warm curacy of the interior,) drank immense quantities of cold water. This person found that the thirst could be in some degree moderated by drinking water acidulated with vegetable acids, and residing in the humid atmosphere of the coast during the wet or misty season. A medical practitioner in Lima proposed, as a last resource, mercurial inunction for the dissipation of the tumour; but I am ignorant of the final result of the case.

Dysentery.—I have already treated so fully of this disease as it occurs on the coast and in the cool and frigid parts of the inland country, that in this notice of it I would only desire to mark its place as a disease of the warm central valleys.

In Huanuco it is an endemic and frequently a chronic affection, complicated with hepatic disorder; and in some instances we find that persons of a sallow complexion, and sickly appearance, with chronic enlargement of the liver, at length fall victims to dysentery or intestinal hemorrhage.

The treatment of this disease as it occurs in the warm valleys of the Sierra may be easily understood from what has been already advanced respecting dysentery on the coast.

In the inland vale of Huacar where there are excellent grapes and a variety of other fruits, which bespeak a genial air, I once saw a lady who had long suffered from a chronic dysentery, unaccompanied with any visceral obstruction, and her disease yielded very readily to a few doses of the infusion of quassia; but in those chronic cases where the liver is diseased and the portal circulation interrupted, different treatment is required. I found under such circumstances, calomel conjoined with opium effect a cure in an obstinate case of five years continuance: and in the simple as well as complicated form of the disease mild mercurialization generally proved a sure remedy.

Here it may be proper to mention, that in the vale of Huanuco, where I have cured many dysenteries, and where the disease was declared by sad experience to be a most fatal one under the usual emolient and depleting treatment of native doctors, I never gave sixteen grains or scruple doses of calomel, as I have done on some urgent occasions on the coast; because in the interior the symptoms were not observed to be so intense as to require rapid mercurialization. And when circumstances allow sufficient time, without hazard to the patient, I would always choose to give the calomel in pills of only four or five grains, with half a grain or a grain of opium once or twice in the twenty-four hours, as it is obvious that by this means the remedy may, in the degree of its operation, be more easily graduated to the satisfaction of the physician and convenience of the patient.

Cholera Morbus.—In Huanuco this disease is vulgarly called lipyria, but is not so common as in Lima or other parts of the coast: in the interior it is considered a very fatal disease. In Huanuco it prevails much in hot dry weather, or in the months of July and August; and here the most common exciting causes of this malady are acknowledged to be irregularities in diet, and particularly eating cheese rendered excessively piquant by agi pepper: and also drinking too much of the fermented liquor called chicha, together with the abuse of the very abundant fruits of this locality. The treatment used by the inhabitants of Huanuco for the removal of their lipyria, or cholera morbus, is ice applied externally to the abdomen; and internally they take tepid lemonade or cream-of-tartar and water. But under this treatment the disease is allowed to be so fatal, that the majority of those attacked by severe vomiting, and purging of thin watery stools of the colour of ashes, are said to perish; whereas on the coast, where ice is taken inwardly and warmth applied outwardly, the number who die of cholera morbus is very inconsiderable, as I had occasion to notice in considering that disease as it occurred in Lima. And it may be worthy of remembrance, that in the violent purging, or vomiting and purging, from the use of the Huachangana, to which I formerly referred in treating of the cure of the Tabardillo, the Indians of the cool and frigid regions, immediately quiet the gastric irritation thus induced by a drink of cold water; a fact which shows that, in the high mining districts as well as on the coast, in cold climates as well as in warm,—in the delicate Limenian as well as the hardy mountaineer, cold drink acts as an efficient sedative in cholera morbus, or in cases analogous to it. And among the Huanuquenos, we may reasonably infer, that a similar practice would be attended with a similarly happy general result, if these people only followed the custom of the capital, in using the ice internally instead of externally in this formidable malady; which, by their own mismanagement, proves so destructive to the population of the delightful vale of Huanuco.

Coto or goitre, and verrugas or warty eruptions, are two diseases that cannot fail to attract the attention of every traveller in the Sierra of Peru. The goitre is a disease principally confined to the central valleys of the Andes, while verrugas are not less remarkably the growth of the Quebradas or glens on the western flanks of the same mountains, though they are also met with in some of the hot central valleys, as in the districts of Conchucos and Huamalies, chiefly inhabited by Indians and Mestizoes. Of these two very striking and common diseases, so prevalent on their respective sides of the great western chain or Cordillera in Peru, I shall offer a few observations.

1*st*, The coto, goitre, or wen, which appears on the fore part of the neck, sometimes attains a very large size, and affects individuals of white race, especially fair complexioned females. Women of Indian or Mestizoe race are less liable to it. Indeed, I do not recollect ever to have seen an Indian, either male or female, affected with it. In Conchucos, as we are told, the disease is not uncommon, though not so frequent perhaps as in the vale of Huanuco; but in either district it shows itself with preference in the more delicate organization of families of European descent. Those affected by this disease are sometimes dumb; but in general the faculty of speech is not affected, and the mind is perfectly sound and unimpaired. Regarding the causes which produce goitre in Peru, I can offer nothing satisfactory; only I may remark, that it certainly is not a disease of the snowy range, but rather of the temperate and warm valleys, in which the natives are found to refer the origin of the disease to their using turbid water during a considerable part of the year when it snows and rains upon the loftier mountains.* With respect to the cure, it may be observed, that iodine is a valuable remedy, which, if applied early in the disease, will prove generally useful. I have been so fortunate as to have removed some goitres with this remedy, though when resident in Huanuco, where the disease is endemic, I had not the means of employing the iodine on a great scale, on account of its scarcity.

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* Should any one imagine that the *goitre* is the effect of drinking snow water, let him explain why this disease should be chiefly confined to one side of the Cordillera, when snow water is equally used upon both sides; and further, why the disease should not arise in the immediate vicinity of the snow on the mountains, as well as in the deep and warm inland valleys where there is no snow?

At Salta, a Buenos-Ayrian province on the confines of Upper Peru, the coto is a common disease; and I was informed by an intelligent native of that country, that before iodine was discovered, the popular remedy was sea-weed conveyed from the shores of the pacific.

2*d*, *Verrugas.*—By verrugas is meant a disease which is introduced by more or less pyrexia, and several days or perhaps weeks of aching pains of the body and limbs more especially; and these precursory symptoms are relieved by an eruption of delicate wart-like excrescences of vascular papillæ, very tender, and apt to bleed freely when roughly touched. The patient, therefore, is generally unable to walk when the eruption is copious; because the motion of the body in the early stage of it would occasion troublesome hæmorrhage, and even when lying in bed, the sheets are usually stained with blood and lymph. The crop is sometimes scanty and confined to the extremities; but, on other occasions, it breaks out on the face and body as well as on the extremities. The eruption, which is often as close as confluent small-pox, is successive; one crop coming on as another drops off, and lasting perhaps for six or eight months, or more. Here and there I have observed some of these papillæ or warty excrescences attain the size of a raspberry, whilst others on the same individual were not larger, and some even much less, than common red currants, or trout's spawn, which they somewhat resembled when only covered with a very thin pellicle on their summit. On being cut at the root by ligature, I did not find the hæmorrhage profuse; but observed that they grew again with great rapidity, and even seemed to attain a larger size, whilst they certainly became more irritable by this treatment. To cauterize them will be found to have no better result; but when allowed to run their natural course they gradually crust, fade, and drop away. This disease, which appears to be an indigenous variety of yaws, is not confined to any particular race or complexion of people, nor generally believed to be contagious or infectious; though some suspect it, without sufficient reason, to be analogous to syphilis. It is properly a disease of the warm glens; and all the cases which I saw in Lima occurred in individuals of white race, who had caught the disease in some quebrada of the Sierra, or in the cabezadas or headlands of the maritime valleys. In two cases of these, one of the persons affected was a Buenos-Ayrian, who had but a spare crop, most of the excrescences not exceeding the size of peas; and the other was a German by birth, who had the crop excessively confluent, while many of the papillæ were not much larger than grains of grouse-shot. These two gentlemen were married, and though we were led to believe that during their illness no precautions were taken to avoid infection, neither of their wives were affected with the disease; and, indeed, I never knew it spread or extend from one to another in a family. I could not learn that it ever attacked the same person more than once during life; nor do I know whether or not it can co-exist with other eruptive diseases. But I may mention that, in a family visited by me, where nine persons were affected with measles, a white boy convalescent from verrugas which he had caught, several months before, in the neighbouring vale of St Ulaya, proved the only exception, or the only one who escaped an attack of measles in this family.

In the treatment of verrugas, the strength must be kept up as much as possible, as the disease is usually of long duration. The remedies generally approved by the medical men on the coast consist of gentle laxatives, warm baths, sarsaparilla, and diaphoretics of various sorts. The natives of the hills and inland glens place implicit confidence in "*agua de mote con vino,*" that is, the water of boiled maize with wine as a remedy in cases of verrugas.

From my own experience I cannot say more in favour of remedies in this affection, than that I found it convenient to regulate the patient's bowels both by diet and medicine, and to keep the skin clean and the body refreshed by an occasional warm-bath, while the disease ran its course towards maturity; which, in those cases where the patient's comforts and diet were well attended to from the beginning, it attained in course of six weeks or two months, when the warty excrescences dropt away, and the patients were left without complaint.

IV.—DISEASES OF THE MONTANA.

On this fourth part of my sketch of the diseases of Peru I have little to say, though I resided for several years in the immediate vicinity of the Montana, or within a few hours journey of the summits of the piles of mountains of the eastern Cordillera range, that constitute the boundary between the now deserted walks of missionary priests, and the Christianized population of the vale of Huanuco. To the eastward of those mountains there is a widely extended forest land, possessing a warm and humid climate, and occupied by savage tribes.

These almost impenetrable woods embrace the fertile regions called Montana; and render the approach to the river Ucayali, and territories of Brazil, by this line, at present all but inaccessible. The following account of the climate in that part of the Montana which corresponds to Huanuco, I consider correct, and as it agrees with the common report concerning it among those whose business leads them often to visit there, I think that it should be stated in this place.

In the Montana of Huanuco, the seasons are only two, the wet and dry. From May to November the sun shines very powerfully, and consequently the soil in the Montana becomes so parched that it is rent open on its surface, but underneath it always preserves its humidity. From November to May it rains sometimes in torrents for six or seven days at a time. The coca plant is indigenous here and yields a fresh crop of leaves every three months. No irrigation is ever required for the sugar-cane, which is no bad proof of the natural humidity of the soil, which yields an annnal crop at very little cost of weeding or cultivation, and the plantations of cane on several estates in this part of the eastern frontier of Peru, have not been renewed, nor yet have they ceased to reproduce fresh annual growths in the memory of their owners. Cane juice is procured in these parts by crushing the cane between wooden rollers turned by oxen; and after it has undergone the process of fermentation, white rum or "*aguardiente*" is made from it by means of earthen stills fabricated on the spot. This distillation is partly encouraged by the landed proprietors, who connive at modern drunkenness, or inebriety short of actual stupidity, as an inducement for such Indians as they can entice from the nearest villages, or the vale of Huanuco, to continue their labour of collecting the coca leaf, which, from its general consumption among the Indian people, is a source of unfailing revenue and profit to the owners of estates in this district. During the rainy season these labourers drink freely of the aguardiente, and when intoxicated, they are said to sleep often in the wet mud, as the ground is every where soaked in rain; and from these causes conjoined, internal diseases and visceral obstructions arise, which very generally lead to swelling of the body and dropsies, which not unfrequently prove fatal, as is well known in Huanuco, whither the sick from the neighbouring montana are conveyed for the benefit of such assistance as the place affords, or they can command.

Coca-mania.—The coca leaf, when moderately used, comforts the stomach of the Indian as good tea does that of the European, and acts in a peculiarly cordial manner. It enables those who use it in moderation to endure a great deal of cold, wet, general fatigue, and even fasting to a surprising degree, and with apparent impunity. But though it in this way fortifies and supports nervous and muscular energy, and keeps up an agreeable exhilaration of spirits, when taken to excess, as is done among many of the coca gatherers, who repair to the montana to indulge in it freely, it is said to excite a species of reverie, which may be looked upon as a variety of mania. Those affected with this coca-mania are always chewing the leaf, and retire to the solitude of the thickets, finding their joy in flying from the presence of their fellow-men, and indulging in silent contemplation, or rather in vague associations and trains of ideas without exercising any rational control of thought, or feeling an interest in the ordinary concerns and duties of life.

The remedy for this disorder, of which I often heard, but never met an example, is simply to return into society, and leave off using coca to excess.

We have the authority of Padre Plaza for considering dysentery and intermittent fevers as very dangerous, and often fatal diseases on the river Maranon, and recent travellers, Lieut. W. Smyth, and Mr F. Lowe, in their interesting account of the mission of Sarayacu on the Ucayali river, under the patriarchal sway of the zealous missionary priest just mentioned, viz. Padre Plaza, inform their readers that, at this "fine and fertile garden of nature," "the prevalent diseases are rheumatism and fever, which occur in December, January, and February, and are not dangerous if the patients abstain from plunging into the water, which they are very apt to do when suffering from the burning heat produced by the latter complaint, and which generally proves fatal.*" The children, and even adults, have a strange taste for eating earth, which they do in large quantities, and it requires great vigilance on the part of the parents to make them abandon the practice; many come to premature death in consequence of it; the only cure for the illness produced is castor-oil and emetics; but we were informed that it is exceedingly difficult to break an adult off the habit."

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* Is it not probable that the evil effects here attributed to the cold bath during the fever may be referred to some mismanagement, or unseasonable application on

"The Padre expressed great fears of the small-pox, none of the Indians at Sarayacu having ever been inoculated or vaccinated. It would be conferring a great blessing upon them if the government of Peru were to supply them with the means of vaccination."*

The following notes were obligingly given me by Mr Mathews, an English botanist now in the practical pursuit of his favourite science in the unexplored gardens of nature on the eastern frontiers of Peru, or in the vicinity of those vast and unfrequented territories occupied by a migratory and scattered savage population. We may reasonably suppose that the medical history of these lands, so little known at present, will unfold itself with the future details of minute geographical survey, and that the diseases, as caused or modified by the peculiar topography of the recesses of the Montana, will disclose themselves completely to future observers, when these feracious solitudes become regularly inhabited in the progress of national improvement and farther extension of civilization. Meanwhile the information conveyed in the following notes, most of which were formerly published in my general work on Peru, † may be worth the attention of the medical reader; for the nature of the prevalent diseases of those parts may be partly inferred from the virtues assigned to the plants or remedies resorted to for the restoration of health.

Notes of Medicinal Plants and Diseases during a journey down the Huallaga, and through part of Maynas in Peru, by A. Mathews.

Machagui Huasca, is a bejuco or climax intensely bitter, and is fresco in calenturas and tertianas. It grows at Tarapoto. *Diablo Huasca,* "purgante or purgative;" at Tarapoto. *Uchu Sanango* in "resfrios" or pains in the joints, produces a sensible stimulating heat, very piquant (it is a species of "Tabernæmontana;" and also said to be used in the preparation of the Pucuna poison (see Humbt.) at Tarapoto and Moyobamba.

Chiri Sanango.—Said to be contrary in its effects to the above; the natives hold it in some dread.

Calentura Huasca or Shiyintu.—This is violent in its effects, pro-

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the part of the sick; and that it only does mischief by checking perspiration, just as iced drinks are often known to do when ill-timed, in the fevers that occur along the shores of the Pacific?

* See Journey from Lima to Peru, by Lieut. W. Smyth, and M. F. Lowe, p. 221–2. And at p. 202 of the same narrative we find it stated that, during their stay at Sarayacu they "registered the thermometer three times a-day, and its minimum and maximum were 75° and 85° of Fahrenheit, while the sun at the same time passed over their zenith. Padre Plaza told them that in the dry months of June, July, and August, the temperature is extremely even, and the heat by no means oppressive, as it is allayed by refreshing breezes, which generally blow in the contrary direction to the current of the river.

† See "Peru as it is," Vol. ii. p. 61.

duces quick full pulse, and high fever, swells the gullet, and in twenty-four hours after the fever, the skin begins to peel off.

This remedy is taken for various complaints, the patient generally retires to his "Chaica" (or country house) to physic himself, where he is not liable to be molested. Generally keeps the bed eight days, and on the fifteenth bathes. For four months it is necessary to diet themselves; (on some men it produces no sensible effects[*]). The part used is the stem roasted, pounded, and taken in warm water, or "Huarapo."

Huaco [†] grows about Tarapoto.

Zuquilla.—This is a thick-rooted variety of sarsaparilla.

Pinon.—This is *Croton Tiglium.* Three seeds eaten act as a drastic purge.

Pucu-unguy, term for erysipelas, a stroke of the sun in Maynas.

Cuchepe, a var. of "Sarna" or *itch,* said to be cured by sarsaparilla and low diet.

Aceyal de Maria, used as a warm plaster in rheumatism.

Yerba de San Martin, an infusion of it is drunk in *purgacion* or gonorrhœa.

Carpuna, a few leaves (two or three entire) put into warm spirit and water, acts as a sudorific, in resfrios or rheumatic pains.

Huyusa, in infusion, same properties, and used as the carpuna (small quantity.)

Tapia bark, bark pounded to powder, and drunk in cold water, a powerful emetic.

[*] This only shows the force of peculiarity of constitution or idosyncrasy.

[†] Huaco, or guaco, is the same remedy which is used on the western coast against the bite of the viper; and it is curious, as well as instructive, to notice how in the Montana of Peru, where venomous serpents abound, as in Guatimala, infested by vipers, Providence should supply the antidote.

ERRATA ET CORRIGENDA.

Paper 1st, Journal, No. 143, Vol. liii.
Page 298, line 8 from bottom, *for* quam *read* quum.
Paper 2d, Journal, No. 144, Vol. liv.
—— 9, —— 20, *for* state *read* site.
Paper 3d, Journal, No. 145, Vol. liv.
—— 359, —— 22, *for* arms *read* anus.
—— —— —— 25, and also page 367, line 17, *for* eat *read* eaten.
—— 370, —— 7, *for* not one, *read* not more than one.
—— 371, —— 29, "Who was habitually given to chew ice to brace her nerves." All this in parenthesis, ( )
—— 373, line 12, *for* become *read* became.
—— 374, —— 7 from bottom, and also page 355, line 8, *for* drank *read* drunk.
—— 375, —— 2 from bottom, *for* occurs *read* occur.
—— 378, —— 8, *dele* take place, and after vomiting, substitute a coma for the semicolon.
Paper 4th, Journal, No. 148, Vol. lvi.
—— 159, line 1, *for* mercurial remedies in general, *read* mercury.
—— 167, —— 23, *for* 1836, *read* 1826.
—— 165, —— 28, *for* during the two, *read* during *each of* the two.
—— 174, —— 7, *for* court, *read* corvette.
Paper 5th, Journal, No. 149, Vol. lvi.
—— 399, —— 2 from bottom, *for* was, *read* were.
Paper 6th, Journal, No. 151, Vol. lvii.
—— 359, —— 7 from bottom, *for* llama-camkani, *read* llama-lamkani; and observe that it is only the wild species of llama that are "ppaco," or brown-coloured, —the domesticated are of diverse colours.

ART. IV.—*Pathological Contributions and Vital Statistics.* By R. BOYD, M. D., Resident Physician St Marylebone Infirmary, Lecturer on Practice of Medicine. (Continued from Vol. lvii.)

THE thirty-six cases of abdominal disease which follow, have been collected since the last communication. The remaining cases, diseases of the vascular system, form the first of a series of cases of disease affecting the contents of the chest. Sixteen of those were cases in which the pericardium was chiefly affected; twenty-eight were cases in which enlargement of the heart was the chief lesion observed; one was a case of aneurism; another a case of hemorrhage; and a third in which the blood itself appeared to be chiefly affected.

CASE 74.—*Diphtheritis.*—Male, aged 15 months; was said to have had diarrhœa previous to admission, which was three days before death; no urgent symptoms appeared till within four hours of death, when difficulty of swallowing and dyspnœa came on.

Appearances.—*Head.*—Brain normal.

Chest.—*Lungs.*—Congestion of lower lobe of right lung, which seemed to be cadaveric; weight of right, 3½ ounces; of left, 2½ ounces. Tongue red at base, with aphthous ulceration; pharynx presented a similar appearance; epiglottis red, with thickening of mucous membrane, which extended to the larynx, upper portion of trachea, and œsophagus.

Abdomen.—*Stomach.*—Mucous membrane of the cardiac extremity in some parts had the appearance as of cicatrices of former ulcers, also several defined patches of red, one of which presented an appearance similar to a herpetic ring of about the size of half-a-crown; rest of mucous membrane healthy, as also that of intestines.

Kidneys.—Right contained a small calculus weighing 10 grains.

CASE 75.—*Cancrum Oris*, *Phthisis*, *Pneumonia.*—Male, aged 3 years; was admitted into the infirmary with symptoms of pneumonia; spreading ulceration of the cheeks and gums appeared three weeks afterwards, and he died one month after admission.

Appearances.—*Head.*—Ventricles of brain dilated, containing from two to three drachms of a clear fluid.

Chest.—Small, miliary, and semitransparent tubercles just beneath pleura, giving a rough feel to surface of both lungs; no pleuritic adhesions; tuberculous cavities evident externally in base of the lower lobes of left lung; tubercles abundant in both lungs; bronchial glands enlarged and scrofulous.

Abdomen.—Organs normal, with the exception of slight congestion of mucous membrane of cæcum.

Mouth.—Ulceration inside right cheek, and also of gums of upper jaw; teeth discoloured; cheek swollen, and of a deep purple; the skin not broken externally.

CASE 76.—*Gastritis from swallowing a Caustic Alkali.*—Female, aged 60. About two months previous to admission swallowed by mistake some American potass in solution, such as is used by washerwomen. She described it as producing a burning sensation in the throat at the time, and has since suffered from tenderness of the epigastrium. Tongue red at the edges; irritability of stomach continued, with short intervals; latterly rejecting all nourishment, and died in a most emaciated condition four weeks after admission.

Appearances.—*Head.*—Brain normal.

Chest.—Lungs slightly congested; no organic disease.

Abdomen.—About two inches of the lower end of the œsophagus, and the whole of the inside of the stomach highly injected with blood; traces of superficial ulceration of the mucous membrane; little appearance of thickening; weight below the average, being only 4 ounces.

CASE 77.—*Cancer of the Pylorus.*—Male; employment tailor, aged 59. He was affected with diarrhœa three months before admission; occasional vomiting, and pain across the abdomen. Those symptoms continued till the time of his death; body greatly emaciated.

Appearances.—*Chest.*—Œdema and some consolidation of the lower lobes of both lungs; tuberculous deposition in the bronchial glands, and roughness of the pleura at the base of the lungs.

Heart.—Very small, weighing only six ounces.

Abdomen.—A mass of variegated scirrhous matter surrounding the pyloric extremity of the stomach, of about the size of half-an orange; intestinal mucous membrane in a healthy state; all the organs below average size; liver, 33 ounces; kidneys, 6 ounces.

CASE 78.—*Tympanitis from Obstruction in the Ileum.*—Female, aged 36. Ever since her confinement, which was about six months before admission, she suffered greatly from distension and uneasiness of the abdomen. The motions from the bowels consisted of a pale-coloured fluid, no solid matter being passed for some weeks before her death. She suffered considerably from sickness; great emaciation; appetite did not entirely fail until shortly before death.

Appearances.—*Head.*—Brain normal.

Chest.—Lungs also normal; heart small, weight only six ounces.

Abdomen.—Small intestines greatly distended, measuring six inches in diameter, and about one-fifth of an inch in thickness; mucous membrane in duodenum tinged with bile; *valvulae conniventes* obliterated in the jejunum and part of the ileum, the mucous membrane being quite smooth and dark-coloured; a few small superficial ulcers at irregular distances in its surface; about the centre of the ileum was a fibrous tumour of the size of a pigeon's egg, between the mucous and serous coats of the intestines, which so narrowed the passage as scarcely to admit an ordinary-sized silver probe; intestines below this in a natural state. Large intestines contracted; mucous membrane of a yellow tinge. In the rectum this membrane was pale and corrugated. Liver weighed 41 ounces; a number of biliary calculi in the gall-bladder, one of them impacted in the cystic duct. Lining membrane of uterus soft and dark-coloured.

CASE 79.—*Enteritis and Cerebro-Spinal Disease.*—Female, aged 40. Affected for some months with hemiplegia of the right side and weakness of intellect. She was seized with an attack of convulsions four days before death, which chiefly affected the paralysed side, accompanied with frothing at the mouth, stertorous breathing. Some blood passed from the bowels the day before death, which was the only symptom evinced of abdominal disease.

Appearances.—Head.—Brain greatly congested; spinal marrow pale; arachnoid membrane lining spinal canal, dry, and firmly adherent to the cord.

Chest.—Lungs; some cadaveric congestion of lower lobe of right, weight 16½ ounces, left lung 11 ounces.

Abdomen.—Mucous membrane of colon thickened, indurated, and of a purple colour. That of rectum presented a similar appearance in a still greater degree, several superficial ulcers in colon; cæcum also diseased. Immense deposit of fat in omentum.

CASE 80.—*Enteritis combined with Pneumonia.*—Female, aged 2 years. Affected with a most obstinate diarrhœa, which was not benefited by treatment; death occurred ten days after admission.

Appearances.—Head.—Brain normal.

Chest.—A small portion of the lower lobes of both lungs in the first stage of hepatization.

Abdomen.—Softening of the mucous membrane of the intestines generally, but more especially of the large.

CASE 81.—*Colitis, Diarrhœa, Pulmonary Tubercle, and Pneumonia.*—Male, aged 10 months. Affected with diarrhœa, and also a slight cough, great emaciation; death occurred four weeks after the first appearance of disease.

Appearances.—Head.—Brain, fluid in larger quantity than usual in lateral ventricles.

Chest.—Lungs, some tubercles on the apex of right, and two small cavities which had a free communication with the bronchi; lobular pneumonia of a portion of the lower lobe of left, a small quantity of lymph effused on the surface covering it; weight of right lung 2¼ ounces, of left 2¾ ounces.

Abdomen.—Intestines; mucous membrane of colon rough from the effusion of lymph on its surface, and at one part red and ulcerated.

Case 82.—*Colitis consequent on Measles.*—Male, aged 4 years; had an attack of diarrhœa on the appearance of the eruption; this continued for a month when child died.

Appearances.—*Head.*—Brain normal.

Chest.—Lungs also normal.

Abdomen.—Redness of the mucous membrane of the colon, and an ulcer of about the size of an almond. Mesenteric glands enlarged; cheesy-looking matter contained in some of them.

Case 83.—*Colitis, Pulmonary Tubercle, and Pneumonia.*—Male, aged 5 years; affected with diarrhœa and cough; died one week after admission.

Appearances.—*Head.*— Brain immensely large, weighing 47¾ ounces.

Chest.—Lungs; a portion of the apex of left lung constricted by a thin band of false membrane; the constricted portion contained some particles of hard gritty matter, such as is frequently observed in old tuberculous lungs. A portion of the anterior edge of right lung in a state of lobular pneumonia.

Abdomen.—Intestines; the entire of the mucous membrane of colon covered with a coating of lymph as in the last case, several oval patches of lymph in lower part of ileum. Liver large and fatty, weighing 37 ounces.

Case 84.—*Colitis combined with Pulmonary Disease.*—Female, aged 79; affected with an obstinate diarrhœa for a fortnight before death.

Appearances.—*Head.*—Not examined.

Chest.—Lungs; pleuritic adhesions of the lower lobe of left lung, which was condensed and of a purple colour; weight 13¼ ounces. Lower lobe of right lung congested, weight 23 ounces

Abdomen.—Intestines; the entire of the mucous membrane of the colon of a deep-red colour, and the greater part of its surface covered with an adherent coating of lymph; no ulceration of the membrane.

Case 85.—*Subacute Colitis, complicated with Pneumonia.* Male, aged 10 months. Diarrhœa of some standing with rapid emaciation; little or no cough; died 25 days after admission.

Appearances.—*Head.*—Rather more than usual quantity of fluid in lateral ventricles.

Chest.—Lobular tubercular pneumonia of both lungs, with some lymphatic effusion on the pleura covering left lower lobe.

Abdomen.—Mucous membrane of colon rough with vegetations (formed of lymph) and at one part red and ulcerated.

Case 86.—*Scirrhous ulceration of the Rectum and Colon, Enlarged Liver and Dropsy.*—Male, aged 18 years; for upwards of three years a patient in the infirmary; had been in three different hospitals in London, in each of which he had been operated on for fistula, altogether as often as eight times. The disease was attributed to a kick received when about eight years of age. Has lost the power of retaining the fæces ever since admission, has been affected with an obstinate diarrhœa, motions liquid, latterly clay-coloured, and of a most offensive odour. Affected with ascites for two months before death, and confined entirely to bed, pale and greatly emaciated. Apparently not more fully developed than a boy of 12 or 13 years of age.

Appearances.—Head.—Brain normal.

Chest.—Lungs; some condensation and congestion of the lower lobe of left lung, which weighed 11 ounces, right 9 ounces.

Heart.—Extremely small, weight only 3½ ounces.

Abdomen.—Contained one gallon and a-half of a clear colourless fluid. Liver of a pale blue colour; fatty, and greatly enlarged, weight 96 ounces; no bile in the gall bladder. Kidneys also enlarged, weight 9¾ ounces; spleen weighed 4½ ounces. The small intestines thin and semitransparent, as far as the lower part of the ileum, the mucous membrane of which was congested. Three small superficial ulcers nearly healed on mucous surface of the cæcum; several ulcers on the mucous membrane of the colon; about fourteen inches of the sigmoid flexure ending in the rectum entirely devoid of mucous membrane. The structures around the lower portion of the rectum of a scirrhous hardness and appearance, the ulceration extended around the anus.

CASE 87.—*Tabes Mesenterica.*—Female, aged 4½ years. Great emaciation. Immediate cause of death an attack of diarrhœa.

Appearances.—Head.—Brain normal.

Chest.—Lungs and heart also normal.

Abdomen.—General enlargement of mesenteric glands; mucous membrane of intestines healthy.

CASE 88.—*Tabes Mesenterica.*—Male, aged 3 months; mother, a patient in the infirmary; child brought up by hand for some weeks. But little wasting or general appearance of debility.

Appearances.—Head.—Brain normal.

Chest.—Lungs also normal.

Abdomen.—General enlargement of mesenteric glands; a greenish fluid in stomach and intestines.

CASE 89.—*Tabes Mesenterica.*—Male, aged 1 month, from out of doors; great emaciation.

Appearances.—Chest.—Lungs; congestion of lower lobes of both lungs.

Abdomen.—Mesenteric glands enlarged and red; other organs normal.

CASE 90.—*Icterus.*—Female, aged 8 days.

Appearances.—Head.—Brain; membranes of a yellowish tinge.

Chest.—Lungs; lower lobes not fully dilated; pleura yellow.

Abdomen,—Liver dark-coloured, rather congested, gall-bladder filled with limpid mucus; no bilious matter in intestines; no obstructions were detected in bile ducts. The whole body was of bright yellow colour.

Case 91.—*Icterus.*—Female, aged 3 weeks; no history of case; brought in for interment.

Appearances.—Head.—Brain; membranes of a yellowish tinge; substance natural.

Ches —Lungs and pleura tinged with bile.

Abdomen.—Intestines of a yellowish colour, very thin in texture; almost transparent; contained a portion of dark-coloured feculent matter. Liver dark-coloured; gall-bladder rather flaccid; contained a little glairy mucus in its fundus, in its upper portion and cystic duct; there was a considerable quantity of dark-coloured matter of the consistence of soft wax filling it, and completely blocking up the duct, sufficient to form a complete mechanical obstruction to the flow of the bile.

Case 92.—*Diseased Liver and General Dropsy.*—Female, aged 52 years; no history given of case.

Appearances.—Head.—Brain normal.

Chest.—Some fluid in both pleural cavities; redness of bronchial lining membrane.

Abdomen.—Liver small, firm, granular, and dark-coloured, weight 30½ ounces; mucous membrane of intestines of a pink colour. Cavity of abdomen filled with a straw-coloured fluid; upper and lower extremities much distended with fluid.

Case 93.—*Hydatids in Liver, Pneumonia, Bronchitis, Tubercles in right Lung.*—Female, aged 83 years, from the work-house, seemed to sink from gradual decay consequent on age.

Appearances.—Head.—Brain, a quantity of fluid on its surface; absorption of its substance, as is so frequently observed in aged persons, and much diminished in weight, being only 33¼ ounces.

Chest.—Lungs dark-coloured, right adherent to costal pleura; a mass of tubercles of the size of a walnut in its apex; chronic pneumonia of lower lobe.

Abdomen.—Liver contained four collections of hydatid cysts, the largest of the size of an orange, one of a smaller size was ossified; capsule of spleen contained earthy deposits.

Case 94.—*Tuberculous Liver and Spleen, Chronic Pneumonia.*—Male, aged 64; great debility, with little or no evidence of defined disease; no cough or symptom of pulmonary affection. From great emaciation and loss of appetite, chronic disease of stomach suspected.

Appearances.—Head.—Brain; about two or three drachms of clear fluid in lateral ventricles.

Chest.—Lungs.—Great congestion of lower lobe of right, its structure somewhat softened; firm pleuritic adhesions on both sides; left being pretty healthy; a vomica of size of pea in the apex.

Abdomen.—Liver; hard tubercles varying from the size of pin's head to a pea on surface, and through substance of liver; the same also were found in spleen, and on the surface of the diaphragm and peritoneum.

Case 95.—*Nephritis, Ulceration of Bowels, Peritonitis.*—Female, aged 24 years; suffered from headach for three months, and diarrhœa two weeks previous to admission, which still continued with bloody stools; pain was complained of in lower part of abdomen. Sulphate of copper was exhibited, but caused sickness; opiates gave some relief; the bloody evacuations were checked by the nitrate of silver. She died one month after admission.

Appearances.—Head.—Brain large, weight 47 ounces, normal.

Chest.—Lungs healthy, some cadaveric congestion of lower right lobe.

Heart.—Small, weight 7 ounces.

Abdomen.—Liver large, weight 52½ ounces, colour natural; kidneys of a mottled whitish grey colour on surface, on which appeared four or five sloughs of the size of a pea, some of which were nearly detached, containing pus, apparently mixed with tuberculous matter. The pelvis of kidney was red, and contained matter of a similar appearance to the above, mixed with urine. Mucous lining of bladder also red. A number of small round ulcers in great intestines, and several cicatrices; many similar shaped ulcers in ileum, some of which appeared in the process of healing; a deposit of lymph on peritoneal surface of bladder and uterus, to which the omentum was adherent; lymphy deposit chiefly on left side, occupying about a hand-breadth of extent of surface.

Case 96.—*Nephritis, Cystitis, Abscess in right Kidney.*—Female, aged 61 years; weak and emaciated; for a length of time in bad health, complaining chiefly of pain in the loins, with a continued fœtid discharge; urine small in quantity. She was admitted into the surgical ward with ulcerated legs, and an abscess on left thigh. She remained in two or three weeks, the ulcers healed, and was discharged at her own request, feeling as well as usual. She was readmitted three or four days afterwards into the medical ward, complaining chiefly of debility, not suffering any acute pain, or showing any urgent symptoms of renal disease. She died three days after her admission.

Appearances.—Head.—Brain normal.

Chest.—Lungs also normal. Heart small, weight 6¾ ounces.

Abdomen.—Pancreas small, weight 1½ ounce; spleen weighed only 1½ ounce; kidneys very large, right alone weighed 8¾ ounces, and left 7 ounces. The interior of the right was excavated, and divided into a number of cyst-like cavities, filled with purulent matter, which communicated with the pelvis of the kidney; this was also filled with matter; the greater part of the cortical and tubular portions were absorbed; mucous membrane lining pelvis thickened, and of a dark colour; left kidney of a natural colour externally, when divided the pelvis was found filled with purulent matter, mixed with blood; mucous membrane lining it red and thickened. Bladder small, contracted, and thickened, some matter on surface; mucous membrane thickened and inflamed.

CASE 97.—*Hydatids of Kidney, Bronchitis.*—Female, aged 102 years, died out of doors.

Appearances.—Body much emaciated; contraction of lower extremities; one-half of right foot in a state of dry gangrene, of a nearly black colour.

Head.—Brain diminished in size, as is usual in old age, weight 37 ounces.

Chest.—Lungs.—Old pleuritic adhesions on both sides, especially left, which was contracted; right lung larger than left; bronchial lining membrane thickened, and the rings partially ossified. Heart weighed 6¾ ounces, ossific deposit on semilunar valves and commencement of aorta.

Abdomen.—Wasting of the organs generally. Liver; a hydatid cyst filled with dry cheesy-looking substance was found on the anterior edge of the left lobe of the liver, of the size of a pigeon's egg, and one still larger in the substance of right lobe, surrounded by a thick opaque membrane. The cyst and their contents were examined by Mr Gulliver, the earthy matter was found to consist chiefly of phosphate of lime, with a small quantity of the carbonate, the cysts themselves to be the remains of entozoa, most likely of the species *echinococcus.* Kidneys, right weighed 2 ounces, left 4½ ounces. Upper portion of left kidney was covered with a thick white semiossified capsule gradually merging in its structure to the healthy capsule towards the lower part of the kidney. In the upper part beneath the same ossified part of capsule was a large hydatid cyst, containing matter similar to that in the liver. Renal capsule firmly adherent to that of the kidney. Spleen, capsule opaque, with ossific deposits; partial ossification of the coats of the arteries generally.

CASE 98.—*Calculi in the Kidneys.—Marasmus.*—Female, aged 6 weeks, when admitted much emaciated; made water freely of a yellow colour; stools greenish; seemed to be suffering little pain.

Appearances.—Head.—Brain normal.

Chest.—Congestion of lower lobe of right lung.

Abdomen.—Kidneys.—Pelvis of both kidneys contained a number of small calculi mixed up with inspissated urine. Some of the calculi were as large as pin's heads; both ureters were dilated; bladder filled with urine.

Case 99.—*Cancer of the Uterus and Fibrous Tumour.*—Female, aged 40. Sank gradually without complaining of any particular pain.

Appearances.—Head.—Brain pale.

Chest.—Lungs, old pleuritic adhesions of lower lobe of left lung; right lung very healthy,

Abdomen. — Uterus, *os tincæ*, and upper part of vagina much ulcerated with gangrenous sloughs; a fibrous tumour attached to fundus of uterus, which was not engaged in the disease.

Case 100.—*Cancer of the Uterus.*—Female, aged 54. Nothing known of the history of the case.

Appearances.—Head.—Brain normal.

Chest.—Lungs, some cadaveric congestion of lower lobe of right lung; heart small; weight 7½ ounces.

Abdomen.—Organs in a state of anæmia; liver small, weight 35 ounces; also kidney, weight 5½; uterus, extensive ulceration of the neck and·anterior portion; no traces of peritoneal ulceration.

Case 101.—*Cancer of the Uterus.*—Female, aged 72; greatly emaciated; sank very gradually; appetite gone for several days before death; skin dry and rough.

Appearances.—Head.—Brain pale.

Chest.—Lungs, old pleuritic adhesions and condensation of structure of right lung; left normal; heart small; weight 7 ounces.

Abdomen.—Kidneys small, weight 6½ ounces; pelvis of both dilated from pressure of uterus on ureters. Uterus, internally in quite a gangrenous state; large portions in a state of slough, only a small part of the body of a firm structure; walls of the uterus not thicker than the bladder; at one part almost ulcerated through into the cavity of the peritoneum. This part was covered by an effusion of lymph and pus. Rectum pressed on, and partly adherent to uterus; mucous membrane of rectum healthy.

Case 102.—*Cancer of the Uterus; Bronchitis.*—Female, aged 79 years, admitted for the chest affection, disease of the uterus not being complained of at first.

Appearances.—Head.—Brain normal.

Chest.—Lungs much collapsed; a firm tuberculous deposit of a grey colour, and size of an almond on the apex of one of the lungs; thickening of the bronchial lining membrane; the tubes filled with inspissated mucus, mixed with purulent matter; heart very small; weight only 5¾ ounces.

Abdomen.—Organs small; uterus, extensive cancerous ulcerations of its neck.

Case 103.—*Peritonitis.*—Male, aged 70, brought in from out of doors; no history of case.

Appearances.—Head.—Brain normal.

Chest.—Old pleuritic adhesions between lungs and parietes; otherwise very free from disease, considering the age.

Abdomen.—Peritoneum red; intestines glued together by plastic lymph; some distension of abdomen; all the organs normal.

Case 104.—*Peritonitis.*—Male, aged 18 days. Mother died from puerperal peritonitis; child sucked her till the day before her death.

Appearances. — Chest. — Lungs dark-coloured, floated on water.

Abdomen.—Contained a quantity of serum, mixed with flakes of lymph, some attached to the intestines, others floating in it; surface of liver rough; intestines red and glued together with lymph. Pus globules were found in the blood.

Case 105.—*Puerperal Peritonitis.*—Female, aged 20. Hæmorrhage occurs after delivery, with hour-glass contraction of uterus, and placenta adherent to its fundus; slight peritoneal pain nine days after delivery, accompanied with fever of a typhoid character. Diarrhœa occurred with occasional delirium; tongue chapped and brown; little or no abdominal pain; a fœtid discharge. The body presented a jaundiced appearance two or three days before death.

Appearances.—Head.—Membranes of the brain of a yellow colour; brain firm and normal.

Chest.—Lungs, œdema of lower lobes of both lungs; a small quantity of lymph effused on right, with traces of subacute pneumonia.

Abdomen.—Liver soft; bile rather inspissated; old adhesions between the right lobe and diaphragm, and also to the intestines; great omentum adherent to the uterus, and also a portion of the colon and rectum. On separating the latter from the uterus some purulent matter escaped, which was prevented from doing so during life, into the cavity of the abdomen, by adhesions; uterus nearly filled the pelvis, some lymph effused on its peritoneal surface, interior was of a dark colour; a portion of placenta, one ounce in weight, was found adherent to its fundus, having an offensive odour. Some purulent matter was found in the venous sinuses. Mucous membranes of intestines healthy.

Case 106.—*Ascites.*—Male, aged 62; stated that he was only one week ill previous to admission; abdomen tympanitic, with a sense of fluctuation; complains of pain in the loins; urine scanty, not albuminous; dropsical symptoms increased; urine at one time almost suppressed; sickness and vomiting set in which continued until death. The matter ejected was a dark-coloured fluid; died one month after admission.

Appearances.—Head.—Brain rather soft.

Chest.—Lungs, œdema of both lungs, especially the right.

Abdomen.—Liver dark-coloured, almost black on surface; spleen similar; both organs, as well as the kidneys, below the average weight; peritoneum thickened and opaque, particularly that covering great omentum; mucous membrane of great intestines covered with a coating of albuminous-looking substance, in some parts almost black, when scraped off, mucous membrane beneath, of a natural appearance; some traces of linear ulceration; *valvulae conniventes* coated in a similar manner; mucous membrane between the valvulae of a healthy appearance.

Case 107.—*Dropsy; Peritonitis; Hypertrophy of right ventricle of Heart; Gangrene of left Foot.*—Male, aged 23; subject to cough, with orthopnœa from childhood, latterly much increased; general dropsy; immense distension of legs and thighs, which was relieved by acupuncture; arms and hands also became affected; swelling abated sometimes in the one and sometimes in the other, without acupuncture. Elaterium was given in the first instance with little benefit; one dose of one-quarter of a grain of morphia increased distress of breathing. The different diuretics were tried. About three weeks before death erysipelatous inflammation commenced in feet and legs, apparently from irritation of acupuncture; this subsided; a gangrenous slough formed on left tarsus; he complained latterly of pain in left hypochondrium.

Appearances.—Head.—Brain very much congested.

Chest.—About six ounces of fluid in left pleural cavity; old pleuritic adhesions of both lungs; some congestion of lower lobe of left, both emphysematous. Heart, weight 11 ounces; cavities filled with blood; right ventricle about double its natural thickness, remaining stiff and open as the left when divided; vessels on surface congested.

Abdomen.—Liver, weight 32½ ounces, small and hard; mucous membrane of intestines healthy; a coating of lymph on surface of liver, also on the peritoneum lining the cavity of the pelvis.

Case 108.—*Dropsy.*—Abortion about the seventh month, apparently dead for some time; epidermis detached. Mother said she felt the child alive *in utero* three days before.

Appearances.—Head.—Scalp distended with fluid brain; a soft homogeneous mass.

Chest.—Fluid in both pleural cavities.

Abdomen.—Distended with fluid.

Case 109.—*Ascites.*—Male abortion of about seven months; mother a healthy young woman of 19 years of age,—her first child; placenta rather adherent. Some hemorrhage followed delivery, and contraction of the neck of the uterus, a portion only of the placenta removed, the rest still remaining till day following, when it was removed.

Appearances.—Head.—Brain normal.

Chest.—Lungs pale and indurated.

Abdomen.—Filled with straw-coloured fluid; liver large, congested; weight 3¾ ounces; pancreas large and indurated; natural structure entirely wanting; weight 55 grains.

DISEASES OF THE CHEST.—VASCULAR SYSTEM.

Case 110.—*Pericarditis, Pleurisy, and Bronchitis.*—Female, aged 40, under treatment for a pleuritic affection of the right side for some considerable period before her admission. She died a fortnight after coming into the Infirmary.

Appearances.—Head.—Brain normal.

Chest.—From eight to ten ounces of purulent fluid in the right pleura, resting on the diaphragm below, and separated from the upper portion of the chest by a thick septum of false membrane, which divided, as nearly as possible, the lower from the two upper thirds. The lower lobe of right lung indurated, no tubercles in either lung, but general redness of the bronchial lining membrane; right lung weighed 21½ ounces; left 16 ounces. Pericardium adhering to the base of the heart through the medium of a thick and rough layer of recently effused lymph. Heart enlarged, weight 13 ounces; its surface covered with a rough coating of lymph, especially towards the apex.

Abdomen.—Liver enlarged, weighed 53 ounces; kidneys very much enlarged, capsule easily separated, structure pale; the cortical and tubercular portion very much alike, as in the first stage of Bright's disease, weight of kidneys 21 ounces.

Case 111.—*Pericarditis, with enlarged Heart, and Emphysema of the Lungs.*—Male, employment a whip-maker, aged 45. The only particulars ascertained of his case was his having been asthmatic during twelve years. When admitted into the Infirmary he was in a moribund state, and died the following day.

Appearances.—Head.—Brain normal.

Chest.—The inferior portion of the left lung firmly adherent to the parietes, and much congested; the upper lobe emphysematous; pericardium presenting a very vascular appearance. It contained eight ounces of purulent matter, and in some parts was adherent to the surface of the heart; heart greatly enlarged, weighing 22 ounces, and red lymph deposited on its surface in three places, each about the size of a halfpenny, and a quarter of an inch in thickness.

Abdomen.—Liver enlarged; weight 63½ ounces; kidneys weighed 9¾ ounces.

CASE 112.—*Pericarditis, complicated with enlarged Heart; chronic Bronchitis, and Emphysema of the Lungs.*—Male; employment, labourer, aged 26; died the day after his admission; affected with rheumatism in one elbow seven days before; has been troubled with cough during the last three years.

Appearances.—Head.—Brain normal.

Chest.—Old pleuritic adhesions on both sides, attaching the lungs to the parietes; emphysema of the lungs, and redness of the bronchial lining membrane; their weight was 44 ounces; pericardium not adherent to the heart; its interior coated with a thin layer of lymph; heart enlarged; weight 13¾ ounces, with a layer of recently effused lymph on its surface, similar to that on the pericardium.

Abdomen.—All the organs enlarged; liver weighed 70½ ounces; spleen, 6 ounces; pancreas, 6½ ounces; stomach, 7¾ ounces.

CASE 113.—*Pericarditis with excessively enlarged Heart and Hæmorrhoids.*—Male, aged 34, with sallow complexion; died five days after admission; was very anxious to have the piles removed as they bled, and were painful; no operation was, however performed; he was suddenly seized with dyspnœa, and died shortly afterwards.

Appearances.—Head.—The convolutions of the brain appeared flattened externally; the sides of the lateral ventricles in contact containing scarcely any fluid; structure of brain normal.

Chest.—Slight congestion of left lung; weight of lungs, 49½ ounces; pericardium so firmly adherent to heart in every direction that it required to be dissected from it; heart greatly enlarged; weight 30¾ ounces.

Abdomen.—Liver of nutmeg appearance; weight 47½ ounces; kidneys enlarged, 12 ounces; stomach, 6 ounces; spleen, 4 ounces; pancreas 2¼ ounces.

CASE 114.—*Pericarditis complicated with enlarged Heart.—Bronchitis, congestion of Lungs; Apoplexy, and softening of Brain.*—Male, aged 80, admitted five days before death in a state of torpor.

Appearances.—Head.—Ventricles of brain distended with fluid. An old apoplectic cyst was found in left *corpus striatum* the size of a large pea; brain surrounding it softened to the extent of half-a-crown.

Chest.—Congestion of lower lobe of the right lung, with some roughness of the pleura covering it; some emphysema of upper lobe; left lung collapsed. Heart, extensive effusion on both surfaces of the pericardium, presenting a honeycomb appearance, and readily detached.

Abdomen.—A mottled spot, of the size of an almond, was found in the left kidney; the other viscera normal.

CASE 115.—*Pericarditis with Pneumonia.*—A servant, aged 50, had cough for six weeks previous to his admission; bronchial respiration over the chest, both anteriorly and posteriorly; no visceral murmur; some dulness on the left side; breathing abdominal and very hurried; countenance distressed; liver extends below the ribs on the right side. In three days after admission respiration normal on right side; crepitation on left side, and still dull; breathing less abdominal; pulse quicker. The following day, pulse soft; sputa tenacious and rusty. In three days after, crepitation was nearly confined to lower lobe of left lung; sputa not rusty, and less tenacious; tongue brown; two days later complained of sputa being tinged with blood; breathing more vesicular on left side; the sputa soon became purulent as well as bloody; debility rapidly ensued, and death three weeks after his admission. The pulmonary symptoms only attracted attention in this case.

Appearances.—*Head.*—Brain normal.

Chest.—Lower lobe of left lung in a state of grey hepatization, it weighed 23 ounces; some congestion in the right lung, which weighed 22½ ounces.

Heart.—The surface covered with lymph, and the pericardium filled with purulent looking matter; weight of heart, 15½ ounces.

Abdomen.—Organs natural.

CASE 116.—*Pericarditis and Bronchitis.*—Male, has been a nurse for a number of years. Aged 73; was first admitted a patient into the surgical ward with ulcerated legs. Whilst there, became affected with anasarca; he was then removed to the medical ward; he gradually recovered from the anasarca. Whilst under treatment he consumed a large quantity of stimulants, often as much as a pint of gin a-day, and this for several weeks.

Appearances.—*Head.*—Brain normal, with the exception of a small speck in right *corpus striatum*, having the appearance of a small apoplectic effusion, after some months.

Chest.—Pleural envelope of right lung thickened, presenting that peculiar appearance so frequent where effusion exists or has existed in the chest; weight of right lung, 22½ ounces; left lung firmly adherent to the parietes, and weighed 17½ ounces; bronchial lining membrane of both lungs red and thickened. Pericardium thickened and adherent to the heart, which was enlarged; the adhesions appeared to be firmer towards the apex of the heart, than at the base and around the large vessels, where the lymph was more recently effused. Heart weighed 18¾ ounces; no ossific deposit in arteries.

Abdomen.—Stomach healthy, and also the liver, which weighed 39½ ounces. Kidneys small, weighing 5½ounces.

CASE 117.—*Pericarditis with Pneumonia.*—Female, aged 14; a servant; in a very feeble and emaciated condition on admission. She died on the following day. Her illness had been of six weeks continuance, it was attended with cough and bloody sputa two weeks before death. About four years ago, she had an attack of scarlatina, and dropsy came on during the convalescence; ever since which time she has been subject to shortness of breathing. Her father was affected with asthma.

Appearances.—Head.—Brain normal.

Chest.—No adhesions of pleura; lungs did not collapse sufficiently, and were partially congested in the lower lobes, especially the right, which was in a state of incipient pneumonia; structure somewhat softened; a pruin juice-coloured fluid escaped from the divided surfaces. Bronchial lining membrane injected. Right lung weighed 16½ ounces, and left, 11 ounces. Pericardium adherent to the heart, which was enlarged; and edges of mitral valves thickened; weight of heart, 10¾ ounces.

Abdomen.—Liver enlarged; weight, 58 ounces; kidneys, 8 ounces; spleen, 4½ ounces; stomach, 2½ ounces.

CASE 118.—*Pericarditis with Phthisis.*—Female, aged 39. The only thing the patient complained of on admission was a harassing cough, which had existed for three months; there was considerable emaciation, and a short time previous to death, sickness and loss of voice.

Appearances.—Head.—Brain normal.

Chest.—Large tuberculous cavities in apices of lungs. Heart and pericardium closely connected by old adhesions; heart weighed 9 ounces.

Abdomen.—Old peritoneal adhesions between the liver and diaphragm; weight of liver, 58 ounces.

CASE 119.—*Pericarditis with General Dropsy.*—Female, aged 60, a servant. The right leg became erysipelatous; epidermis raised in blisters, which discharged, and the skin became gangrenous.

Appearances.—Head.—Brain normal.

Chest.—Contained a small quantity of fluid; lungs emphysematous, attached to parietes by old pleuritic adhesions; a small portion of recent lymph on lower lobe of left lung; congestion of lower lobes of both lungs; heart much enlarged, and adherent to pericardium; adhesions easily separated; mitral valves thickened; pulmonary artery remarkably dilated, weight of heart, 18½ ounces; weight of right lung, 24 ounces; of left, 22 ounces.

Abdomen.—Contained some fluid; kidneys enlarged, weight, 14 ounces; weight of liver, 47 ounces.

CASE 120.—*Pericarditis with gangrenous sores on hip and sacrum from long confinement to bed.*—Female, aged 52; died in the workhouse.

Appearances.—Head.—Brain not examined.

Chest.—Lungs exceedingly healthy; weight of right, 7½ ounces; left, 7½ ounces.

Heart.—Old and firm adhesions between it and the pericardium, especially round the origin of large vessels; pericardium semitransparent; heart weighed 9¾ ounces. Abdominal organs normal.

CASE 121.—*Pericarditis with Pleuritis.*—Female child, aged 4 years.

Appearances.—*Head.*—Brain normal, weight, 41 ounces.

Chest.—Right lung congested, a small tuberculous deposit in its apex; weight of lung, 7¼ ounces; left lung coated with a thick layer of lymph; heart and inner surface of pericardium covered with lymph.

Abdomen.—Organs natural.

CASE 122.—*Pericarditis with acute Rheumatism.*—Female, aged 16. Illness attributed to having caught cold from wet feet four days previous to admission; legs and feet painful, pains worse at night; throat red and slightly swollen; pulse quick; has never menstruated; diarrhœa came on six days after admission, but was checked by the usual remedies; in four days after considerable anxiety of countenance was observed, and the patient winced, whenever the ends of the fingers were pressed between the intercostal spaces over the heart; equal pressure made in other situations seemed to give but little uneasiness; the pains in extremities were not complained of; anxiety of countenance continued unabated; and death occurred on the twelfth day after admission.

Examination twenty-eight hours after.

Appearances.—Body small; mammæ not at all developed, like those of a child ten or twelve years; the thymus body as large as that of a newly born infant, its weight a drachm and a-half.

Head.—Brain congested, weight 47¾ ounces.

Chest.—*Lungs.*—Lower lobe of right lung congested, weighing 8½ ounces; left lung weighed 7 ounces.

Heart.—A small portion of recent lymph on right auricle, its appendix adhering through the medium of lymph to the auricle; some redness at roots of great vessels just above their junction with heart; weight of heart 8½ ounces.

Abdomen.—Sigmoid flexure of colon presented some patches of redness on its internal surface, and a few small ulcerated points; liver weighed 41 ounces; kidneys, 6; uterus very small, one and a-half drachm.

CASE 123.—*Pericarditis and enlarged Heart with Pulmonary Disease, diseased Kidneys and Dropsy.*—Female, aged 36. Ill for a year and a-half, the greater part of the time confined to bed; knees contracted, semiflexed; anasarca of extremities; there was a tumour on back part of the skull, which was preternaturally thickened just above the occipital protuberance.

Appearances.—Head.—Convolutions of brain flattened; about 2 ounces of clear fluid in lateral ventricles.

Chest.—The pleura contained some fluid. Emphysema of the upper lobes of lungs, and first stage hepatization, lower lobe of one lung; pericardium closely adherent to the heart, which was enlarged, its weight 17¾ ounces; ossific deposit in mitral valve on one side; Bright's disease of kidneys, which were smaller than natural, their weight 7¾ ounces.

Case 124.—*Hydrops Pericardii, with general dropsy, enlarged heart, and convulsions.*—Female, aged 48.

Appearances.—Head.—Brain normal.

Chest.—Contained a considerable quantity of fluid; lower lobes of both lungs compressed from the fluid; their structure condensed and in a congested state; weight of lungs, 31 ounces; pericardium distended with fluid; concentric hypertrophy of left ventricle of heart, which weighed 15¼ ounces; bony deposits in aorta.

Abdomen.—Contained some fluid; liver small and hard; convex surface of right lobe rough; weight of liver, 28½ ounces; kidneys wasted, cortical structure unusually pale, their weight, 5¼ ounces.

Case 125.—*Hydrops Pericardii, enlarged heart, bronchitis, congestion of brain.*—Female, aged 13. No history of the case; the body brought to dead house previous to interment.

Appearances.—Head.—Vessels of brain greatly congested, and convolutions flattened; divided structure had a marbled appearance from the number of bloody points; no effusion in ventricles.

Chest.—Slight pleuritic adhesions of the right side; lining membrane of bronchial tubes red; right lung weighed 10 ounces, and left lung, 11½ ounces. Pericardium contained a considerable quantity of fluid, no appearance of lymph or any thickening of membrane; endocardium presented a mottled appearance, pale pink, with numerous red spots; heart above the average size of an adult's, weight 9¼ ounces; thymus body present, weight two drachms.

Abdomen.—Kidneys and liver congested; weight of liver, 28 ounces; of kidneys, 9 ounces; ovaries were large and soft.

Enlargement of the heart, although so frequently found combined with pulmonary disease, dropsy, and apoplexy, as a distinct uncombined disease is very rarely met with. The following cases include only those in which the symptoms indicated that this was the organ principally affected. It may be interesting to state the extreme disparity in the weight of the heart, that has been remarked in the course of those observations, varying in the adult, from 3½ ounces to 31 ounces,—an instance of the first occurred in a male aged 40 years. A difficulty often arose from the great complication of disease, in what class some of the following cases should be placed. A large proportion of the cases appear to be favourable to a statement made by Dr Clendining, that, as a general rule, enlargement of the heart is always accompanied with enlargement of the other organs.

Case 126.—*Enlargement of the Heart and Pleuritis.*—A gardener, aged 45; death five days after admission.

Appearances.—Head.—Brain normal.

Chest.—Considerable effusion of fluid on each side, some adhesions between parietes and lungs with congestion of their lower lobes; weight of right lung, 26¾ ounces; left, 26½ ounces. General enlargement of the heart, dilatation of its cavities, and slight thickening of the valves; weight of that organ, 27 ounces.

Abdomen.—Liver enlarged; weight, 73 ounces; kidneys also enlarged, weight 13¼ ounces.

Case 127.—*Enlargement of the Heart with Hydrothorax.*—Male, aged 78, a very fat subject, was seized suddenly on the evening previous to his death with great difficulty of breathing.

Appearances.—Head.—Brain large; cerebrum weighed 48 ounces; cerebellum, 5¾ ounces; and *medulla oblongata* with *pons varolii*, 1½ ounce.

Chest.—Contained about two pints of fluid; congestion of lower lobe of right lung; thickening and redness of the bronchial lining membrane in both lungs; right lung weighed 27 ounces, and left, 21 ounces; heart much enlarged, and cavities dilated; its weight, 20½ ounces.

Abdomen.—Organs enlarged; liver weighed 60½ ounces; spleen, 7 ounces; kidneys, 12 ounces; renal capsules, 1½ ounces; pancreas, 4 ounces, and stomach, 8¾ ounces.

Case 128.—*Enlargement of the Heart, with anasarca and Pulmonary Apoplexy.*—Male, aged 45, died out of doors; no history of the case.

Appearances.—Head.—brain normal.

Chest.—Lower lobes of lungs congested, especially the right one, in the substance of which, in the anterior edge about the centre, was found a small dark spot of blood. Right lung weighed 33¼ ounces, left lung 28¾ ounces.

Heart very much enlarged, weighed 21 ounces.

Abdomen.—Organs congested; liver weighed 56 ounces, kidneys 11 ounces.

Case 129.—*Enlarged Heart, complicated with pulmonary disease and dropsy.*—Male, aged 74, suffered much from dyspnœa and anasarca of the lower extremities for two weeks previous to his admission; no alleviation of symptoms from the remedies used;

antispasmodics, mercury, and elaterium. Some blood passed with motions after the use of the latter medicine.

Death within three weeks after admission.

Appearances.—Head.—Brain normal.

Chest.—Left pleura contained about two pints of fluid; structure of left lung condensed; pleura covering it thickened; some digital processes from the part of the lung immersed in the fluid; weight of the left lung 24 ounces.

Lower lobe, and posterior portion of upper lobe of right lung in first stage of hepatization; the red hepatized portion sunk in water; weight of right lung 51 ounces. The left lung, although compressed by the fluid, must have been the principal medium by which respiration had been carried on; the right lung being so extensively diseased.

Heart enlarged; weight 22 ounces, much corrugated, and ossific deposit on the aorta.

Abdomen.—Organs normal; some congestion of mucous membrane of cæcum.

Case 130.—*Enlarged Heart, with Pulmonary Disease.*—Male, aged 75; died two days after admission; affected with asthma for some time, but not worse than usual, till the last two weeks, when his appetite began to fail him.

Appearances.—Head.—Brain normal.

Chest.—No pleuritic adhesions; redness and thickening of bronchial lining membrane in both lungs, and emphysema of their upper lobes. The lower lobe of right lung and posterior portion of the upper lobe very much congested. The right lung weighed 37½ ounces, and left 20 ounces.

Heart.—Its parietes greatly thickened; cavities dilated, and containing coagulated blood; weight, 16½ ounces.

Abdomen.—Liver large and congested; its weight 65 ounces. Kidneys also congested; the right considerably the largest, its weight 7¼ ounces; the left weighed 4½ ounces.

Case 131.—*Enlargement of the Heart, with Dropsy.*—Male, aged 72; had a fit, described as one of apoplexy, a week before his admission; the dropsical symptoms being the most urgent during the time he was a patient; died five weeks after admission.

Appearances.—Head.—Wasting of the convolutions of brain, as commonly seen in old persons, with serum on the surface, and congestion of the vessels.

Chest.—About one pint of fluid in each side. Lungs of a dark colour and structure condensed; congestion of the lower lobe of right lung, which weighed 27 ounces; left lung weighed 18¼ ounces.

Heart very much enlarged; a bony ring round the base of the sigmoid aortic valves; weight of heart, 23¾ ounces.

Abdomen.—Contained some fluid; mucous membrane of stomach congested and thickened; a cicatrix of a former ulcer apparent; weight of stomach, 7½ ounces. Liver enlarged, 55 ounces. Some small serous cysts in kidneys, which weighed 11½ ounces.

CASE 132.—*Enlarged Heart, with Dropsy.*—Labourer, married, aged 48; eleven weeks ill; recently discharged from an hospital, in which he had been a month; died two weeks after admission to infirmary.

Appearances.—Head.—Brain normal.

Chest.—Fluid in both sides; the whole quantity between three and four pints. Lungs; the lower lobes of both congested, with condensation of their structure; heart enlarged, and all cavities dilated and thickened; no valvular disease; weight of heart, 20½ ounces.

Abdomen.—Organs enlarged; liver weighed 51½ ounces; kidneys, 12 ounces; and stomach 8 ounces.

CASE 133.—*Enlarged Heart, complicated with Asthma.*—A horse-keeper, aged 54; subject to cough for two winters; for last three weeks very ill; he was in a sinking state when admitted, from which he never rallied, and died the following day.

Appearances.—Head.—Brain normal.

Chest.—Lungs; bronchial mucous membrane thickened, and tubes dilated.

Heart.—Its cavities dilated, and walls very much thickened; apex rounded; coagulæ in both sides.

Abdomen.—Liver enlarged and congested; weight, 63¼ ounces, and kidneys in a similar state, weight, 13¾ ounces.

CASE 134.—*Enlarged Heart, with Chronic Disease of the Brain*, in a male aged 72. No particulars of case; brain large; weight, 52½ ounces; weight of heart, 18¾ ounces; liver weighed, 58 ounces; spleen 10½ ounces, and stomach, 8¼ ounces.

CASE 135.—*Enlarged Heart, with Emphysema of Lungs and Pneumonia.*—A dustman, aged 43; a long time ill, suffering from chest disease, for which he had frequently been a patient before.

Appearances.—Head.—Brain large; weight, 54½ ounces.

Chest.—Emphysematous state of both lungs; bronchial mucous membrane red and thickened: lower lobe of left lung congested, and part in first stage of hepatization; weight of lungs, 61 ounces.

CASE 136.—*Enlarged Heart, Diseased Aorta, and General Dropsy.*—Male, aged 67.

Appearances.—Head.—Brain normal.

Chest.—Some fluid in right pleura, and the lower lobe of right lung compressed by it; weight of lung, 22 ounces. Left lung adherent to parietes; weight, 14½ ounces.

Heart.—Left ventricle very much thickened; weight of heart, 16¾ ounces. Atheromatous deposit, and two points of ulceration in aorta; largest ulcer about the size of a split-pea.

Abdomen.—Contained a considerable quantity of fluid; liver rather small, of a dark colour; preternatural adhesions between it and the diaphragm; peritoneum thickened; also thickening of the omentum.

Case 137.—*Enlarged Heart and Enteritis.*—Male, idiot, aged 25. Died in the workhouse suddenly, in convulsions.

Appearances.—Head.—Skull unusually thick, and brain firm; weight of brain, 45¾ ounces.

Chest.—The apex of left lung contained a chalky deposit, and also a small quantity of thick purulent-looking matter; slight pleuritic adhesions on both sides, and slight redness of bronchial lining membrane of both lungs.

Heart.—Parietes much increased in thickness; weight, 17 ounces. No disease of valves.

Abdomen.—Liver weighed 49 ounces, and kidneys 10 ounces. Mucous membrane of both ileum and colon of a florid red colour; minute vessels injected; no ulceration or apparent thickening of the membrane.

Case 138.—*Enlargement of the Heart and Asthma.*—Male, aged 26; suffering very much from dyspnœa; almost in a moribund state when admitted, and died the day after.

Appearances—Head.—Brain rather pale.

Chest.—No pleuritic adhesions; the lower lobe and posterior portion of right lung œdematous; its weight, 35½ ounces. Emphysema of upper and anterior portion of both lungs; their bronchial lining membrane red and thickened; the left lung weighed 25 ounces. Heart enlarged; its cavities dilated, and their parietes thickened; weight, 15½ ounces.

Abdomen.—Both the liver and kidneys enlarged and congested; weight of liver, 67 ounces; kidneys, 14 ounces; the mucous membrane of intestines red; more so in cæcum and ileum than in any other portion of the canal.

Case 139.—*Enlarged Heart, with Asthma.*—A tailor, aged 70. Died two weeks after admission; suffering from great dyspnœa and rheumatic pains in the limbs.

Appearances.—Chest.—There was a fatty tumour, weighing eight ounces, attached externally to the ribs on the right side; emphysema, redness, and thickening of the bronchial lining membrane in both lungs; their weight, 50¾ ounces; weight of heart, 17½ ounces.

Abdomen.—Organs enlarged; liver weighed 69½ ounces; spleen, 7¾ ounces; stomach, 7½ ounces; and kidneys, 13¼ ounces.

Case 140.—*Enlarged Heart, with Pulmonary Disease.*—An eating-house keeper, aged 67, subject to frequent attacks of dyspnœa and pain of the chest. Died three days after admission.

Appearances.—Chest.—Both lungs firmly adherent to the parietes; their structure condensed; weight of lungs, 56 ounces.

Abdomen.—Liver enlarged; weight, 58½ ounces.

Case 141.—*Enlarged Heart, with Pulmonic Disease.*—A labourer, aged 32; cough and dyspnœa of two weeks standing; died third day after admission.

Appearances.—Head.—Brain appeared normal.

Chest.—Pleuritic adhesions of both sides; congestion of lower lobes of both lungs, with their texture softened, especially the right one; bronchial lining membrane red and thickened; the right lung weighed 24½, and left 18½ ounces.

Heart.—Enlarged; weight, 15½ ounces.

Abdomen.—Organs enlarged; the mucous membrane of the intestines congested; the liver weighed 64½; kidneys, 14; and spleen 7 ounces.

Case 132.—*Enlarged Heart; Dropsy and Bronchitis terminating with Enteritis.*—Male, aged 42, affected with cough during five winters. On admission, he suffered much from dyspnœa and palpitation of the heart, which he stated he felt beating low down in the chest. About a month after anasarca, swelling of the legs, thighs, scrotum, prepuce, and lower portion of abdomen came on. To relieve which the acupuncture needles were used and frequently repeated at the patient's urgent request. The left thigh afterwards became red and painful, and so hard, as scarcely to yield on pressure. To relieve which leeches, &c. were applied. An ulcer, formed on the under surface, from this matter was discharged, and so the limb became much diminished in size. The right leg also became red, &c., much in the same state as the opposite thigh, and was dark-coloured, with patches of yellow dead cellular tissue, almost in a sloughing state, at which time he died, being about three months after his admission. The palpitation still continuing, orthopnœa for the last four or five weeks, and also considerable pain in the abdomen.

Appearances.—Head.—Brain normal.

Chest.—Adhesions of old standing between the costal and pulmonic pleura on both sides, except at the apex of right lung, around which there was a quantity of straw-coloured fluid. The pleura at this part was thickened; and some induration in the lower lobe; weight of lung, 25½ ounces. Extensive induration in the lower lobe of left lung; weight of lung 34 ounces; bronchial lining membrane in both lungs red and thickened; pericardium nearly filled with slightly coloured fluid; heart enlarged; the right auricular-ventricular opening appeared unusually wide; all the cavities dilated, and their walls thickened; the right auricular appendix filled with a firm clot of fibrine, and portions of this impacted between the *musculi pectinati*, in which the central softening, as described by Gulliver, had taken place; weight of heart, 15 ounces.

Abdomen.—Contained some fluid; the organs enlarged; the liver and kidneys congested, the former weighed 54 ounces, the latter, 15 ounces; spleen, 10½ ounces; pancreas, 4½, and stomach 6 ounces. The mucous membrane of stomach, and throughout the whole of both small and great intestines of a florid red colour.

Case 143.—*Enlarged Heart, accompanied with Asthma and Anasarca.*—Char-woman, aged 56; admitted a fortnight before death; subject to cough for twelve months, which greatly increased from the time of her admission, and was attended with anasarca of her feet, legs, and face.

Appearances.—*Head.*—Brain pale but firm in structure; about three drachms of clear fluid in the lateral ventricles, the fifth also dilated by fluid; *septum lucidum* firm, and apparently thickened.

Chest.—Emphysema of both lungs; the ramifications of bronchial tubes dilated, and their lining membrane red and thickened; no pleuritic adhesions; left ventricle of heart very much thickened, and its cavity greatly diminished in size; the right ventricle appeared like a mere appendix to the left; weight of heart, 18½ ounces.

Abdomen.—Kidneys weighed 4½ ounces; liver weighed 48½ ounces.

Case 144.—*Enlarged Heart, with Pulmonary Disease and Dropsy.*—A washerwoman, aged 44, admitted with ascites and anasarca of the extremities. She died a fortnight after admission, and had on a former occasion been treated in the infirmary for pectoral disease.

Appearances.—*Head.*—About one ounce of fluid in the lateral ventricles.

Chest.—Emphysema of both lungs; their bronchial lining membrane red and thickened; the lower lobes of both in the first stage of hepatization; weight of lungs, 58 ounces; heart enlarged with dilatation of its cavities, and opacity and thickening of the endocardium; weight of heart, 14 ounces.

Abdomen.—Contained a considerable quantity of fluid; liver, weighed 45 ounces; kidneys enlarged, weighed 11½ ounces.

Case 145.—*Enlarged Heart, with Pulmonary Disease.*—Female, aged 80, died in the chronic ward in the workhouse; appeared to die from the effects of old age, more than from any other cause; no evidence of any particular disease apparent.

Appearances.—*Head.*—Brain normal.

Chest.—Upper lobes of both lungs emphysematous, with the bronchial membrane thickened; heart enlarged, weighed 12 ounces; ossification of mitral valves; all its cavities filled by coagulated blood.

Abdomen.—Liver weighed 43¼ ounces; spleen, 8¾ ounces, and very soft.

CASE 146.—*Enlarged Heart; Asthma; and Ulceration of the Stomach.*—A nurse, aged 56, asthmatic for many years; about four years before her last illness, she had a severe attack of vomiting of blood; from this she recovered her usual health; a second attack followed two years and a-half afterwards, from which she also recovered. The last return of the disease came on six weeks before her death, and was more severe than any of the previous, continuing for several days, and then left her perfectly blanched, and in an extremely debilitated condition; she gradually sunk, worn out apparently from cough and difficulty of respiration.

Appearances.—Head pale.

Chest.—Emphysema and œdema of lower lobes of both lungs, and also back part of the upper lobe of right. A hard tuberculous deposit about the size of a filbert in the apex of right lung; the lining membrane of the bronchial tubes thickened; right lung weighed 38 ounces; left 21 ounces; dilatation of the cavities of the heart, and thickening of their parietes; weight 17½ ounces.

Abdomen.—An ulcer of the size of the little finger on the lesser curvature of the stomach in progress of healing; some puckering round its edge, but without induration or thickening; liver large and pale; weight 49½ ounces; kidneys also pale, weight 11½ ounces.

CASE 147.—*Enlarged Heart, Asthma, and effusion of Blood in the right renal Capsule.*—Female, aged 87, married at the time of the Gordon riots, had outlived all her relations, an inmate of the workhouse; for several years suffered from orthopnœa, during the two last years no dropsical swellings.

Appearances.—*Head.*—Brain normal.

Chest.—Old pleuritic adhesions on both sides; some congestion in the lower lobe of right lung; redness and thickening with muco-purulent secretion on bronchial lining membrane; right lung weighed 25½ ounces; left 18½ ounces. Enlargement of the heart and dilatation of its cavities, weight 17½ ounces; ossific deposits at the roots of semilunar valves at the aortic opening; similar deposit along the course of aorta, which contained a loose dark coagulum: the renal artery at its origin also ossified.

Abdomen.—Organs enlarged; the liver weighed 51 ounces; spleen, 5½; stomach, 6½; pancreas, 4 and kidneys, 13 ounces. There was a clot of blood which filled and distended the right renal capsule; its weight being 1¾ ounce; the left weighed half-an-ounce.

CASE 148.—*Enlarged Heart, Dropsy, and Bronchitis.*—Char-woman, widow, aged 86, subject to dropsy of the lower extremities and belly during the last two years, which, upon two or three occasions, had been relieved by treatment. For three months previous to her admission, she suffered from orthopnœa, and required the use of medicine every day or second day, to keep the bowels open; urine scanty and red; albuminous deposit produced by the nitric acid or heat tests. A moveable tumour about the size of a large orange was felt in the abdomen, which caused her a sense of uneasiness, but no pain on pressure; cough frequent and troublesome.

Appearances.—Head.—Congestion of the vessels of brain and scalp.

Chest.—Contained about half-a-pint of fluid; the lower lobes of both lungs compressed by fluid, and their structure dark and condensed; bronchial lining membrane thickened and red; weight of right lung 15½ ounces; left 14½ ounces. Heart enlarged and thickened, with the cavities dilated.

Abdomen.—Organs enlarged; liver weighed 57 ounces; kidneys, 10; spleen, 6; stomach, 7; and pancreas, 4. The mucous membrane of the cæcum and lower portion of ileum red. The tumour felt externally was found to be attached to the great omentum and cæcum, and was caused by a large bone, like a portion of a vertebra that had been swallowed, and become sacculated in the intestine, which was pretty closely adherent to it; a round opening, about the size of the top of the little finger existed between the intestine and sac, out of which some fæces escaped on pressure.

CASE 149.—*Enlarged Heart, Dropsy, and Bronchitis.*—Female, aged 72, for some time in the work-house, formerely a shopkeeper, married, but had never borne children. Had been affected with cough for seven years; anasarca of lower extremities for ten days, and orthopnœa for three days before death, which was sudden.

Appearances.—Head.—Congestion of the vessels in the brain.

Chest.—Contained about one pint of fluid; no pleuritic adhesions; some congestion of the lower lobe of right lung; bronchial lining membrane red and thickened; right lung weighed 16 ounces, left lung 12 ounces.

Heart.—Enlarged, and valves on both sides thickened; weighed 13 ounces.

Abdomen.—Organs small; liver weighed 29 ounces, kidneys 7½, spleen 2, stomach 4, and pancreas 2½; mucous membrane, of intestines congested, especially in the colon and duodenum.

CASE 150.—*Enlarged Heart, Dropsy, and Bronchitis.*—Charwoman, aged 67, admitted from out of doors in almost a moribund state; waxy appearance of countenance with blue lips; great dyspnœa and anasarca of the lower extremities.

Appearances.—Head.—Congestion of the vessels in the brain.

Chest.—Contained about 1½ pint of fluid; costal and pulmonic pleura on the right side, adherent; weight of lung 15 ounces; congestion of lower lobe of the left lung; weight of lung 18 ounces. Bronchial lining membrane of both lungs red and thickened.

Heart.—Enlarged, weight 13½ ounces.

Abdomen.—All its organs enlarged; weight of liver 48; kidneys, 11; and spleen, 5½ ounces.

CASE 151.—*Enlargement of the Heart, with Dropsy.*—Female, aged 64, suffering from dyspnœa and anasarca of the lower extremities, in an extremely feeble state when admitted, and died on the fourth day following.

Appearances.—Head.—brain normal.

Chest.—About a pint of fluid in the pleura of the right side; lower lobe of right lung compressed; its structure condensed and dark in colour; weight of lung 17¾ ounces; left lung larger in volume than right; weight 15¾ ounces; heart simply enlarged, weighing 15¼ ounces.

Abdomen.—Kidneys small; weight 5 ounces; liver, 44½; the other organs normal.

CASE 152.—*Enlarged Heart, complicated with Asthma.*—Female, aged 79, died in a chronic ward of the workhouse.

Appearances.—Head.—Brain normal.

Chest.—Emphysema of the lungs, and thickening of the bronchial lining membrane.

Heart.—Enlarged; weighed 15 ounces, with bony deposits in the semilunar valves of the aorta.

Abdomen.—Organs normal; liver weighed 40 ounces.

CASE 153.—*Enlarged Heart, with Bronchitis.*—Female, aged 35, died two days after admission; cough very troublesome for the last two weeks, and orthopnœa for four days; visage purple; Heart's action not recognizable; pulse small.

Appearances.—Head.—Brain normal.

Chest.—General redness, and thickening of bronchial lining membrane; considerable congestion of lower lobe of right lung; the lung weighed 26½ ounces; the left weighed 19 ounces.

Heart.—Cavities distended with coagulated blood; weight 12½, liver 57½, kidneys 10½, spleen 11, and pancreas 5 ounces.

CASE 154.—*Enlargement of the Heart, with Bronchitis.*—A female, aged 95, appeared to sink from natural decay.

Appearances.—Head.—A tumour, of the size of a musket bullet, attached to the posterior portion of the dura mater, with a corresponding depression in the brain, and some serum effused on its surface.

Chest.—Some redness of bronchial lining membrane; no pleuritic adhesions.

Heart.—Left ventricle thickened.

Abdomen.—The liver weighed 41 ounces; kidneys small, weighing 5 ounces.

CASE 155.—*Aneurism of the arch of the Aorta bursting into the œsophagus.*—A stable man, aged 67, was suddenly seized in the workhouse with faintness and pain in the stomach and bowels, and was immediately admitted into the Infirmary; he recovered a little, but died the following morning quite suddenly after taking some tea. For some weeks previous to this attack, he had been subject to diarrhœa, which had considerably reduced him.

Examination twenty-nine hours after death.

Appearances.—Head.—Arachnoid membrane thickened; brain very pale, about 1½ ounce of clear fluid in the lateral ventricles.

Chest.—A tuberculous deposit in apex of left lung, with a small cavity in its centre; lower lobe of right lung firmly adherent to the parietes and in a state of chronic pneumonia, loaded with prune-juice-like fluid; left lung weighed 10 ounces; right, 16½; heart normal, weight, 9 ounces; arch of aorta dilated, the inner coats of the vessel forming a ring, which could be felt by introducing the finger where it was separated from the heart. The dilatation included the origin of the innominata as far as the descending aorta where the artery was again of the natural size. The dilated portion or sac of the aneurism was firmly adherent to the œsophagus, which passed behind it, and they communicated by means of an oval opening one inch long, and half-an inch broad, as seen in the sketch of the preparation made by my friend Mr Bush, through which the blood escaped into the stomach, and caused the sudden death. The opening in the recent state was closed by a clot. The mucous membrane of the œsophagus was dark, and the tube itself very thin in the neighbourhood of the opening.

Abdomen.—Stomach filled by a coagulum of blood, which retained the form of that organ, and weighed 15½ ounces; a small quantity of blood was found in the duodenum, some dark fœtid fluid in the jejunum; about one-third the length of the ileum was firmly contracted and contained scybala. The greater part of the colon filled with a dark fluid similar to that in the jejunum. All the other organs natural.*

CASE 156.—*Hæmorrhage internally.*—Female, aged 40, wife of a professional man, was suddenly seized with acute pain in the abdomen, which was followed by sinking of the vital powers, and she died in six or eight hours.

I examined the body with the medical men who attended the case.

Appearances.—Head.—Not opened.

The body had a blanched appearance.

Chest.—No disease detected.

Abdomen.—Contained about five or six pints of blood, but from where it had escaped was not clearly ascertained; there were ossific deposits in the right iliac artery, and softening of the lining membrane of the aorta, which was easily separated from the middle coat. The organs appeared to be normal.

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* Within the period (two years) in which these cases have been examined, four other cases of aneurism of the aorta have occurred, and were published in the 1st Vol. of the Lancet for 1840-41.

Case 157.—*Cachexia.*—Female, aged 42; had an ulcer on thigh, which confined her to bed, for a considerable time, at her own home; admitted in a most emaciated state, having the countenance of one dying from a malignant disease; she had neither pain or sickness, the wound on the thigh had healed, and only complained of loss of appetite.

Appearances.—*Brain.*—Pale.

Chest.—Œdema in lower lobe of right lung; weight of lung, 19 ounces; left lung weighed 14 ounces; heart small, weight, 6 ounces.

Abdomen.—Organs small, no diseased appearance; intestines thin, with small ulcerations on their mucous membrane.

Statistical Reports of the Diseases, &c. of the out-door Patients of the St Marylebone Infirmary for three years.—The annexed tables are drawn up for the purpose of exhibiting ~~the~~ nature of the diseases and their results occurring amongst the out-door poor visited at their own houses, during a period commencing in the winter of 1838 and ending with the autumn of 1841.

It will be observed that the cases are arranged according to the season in which they have been treated, and the age when they have applied. In this way a comparison can be readily made of the prevalence of disease at different seasons and at different periods of life, together with the mortality. For the purpose of affording medical relief, the parish has been divided into two districts, eastern and western, to each of which one medical officer is appointed, whose respective duty consists in prescribing for those who are able to attend at the infirmary, and in visiting those who are unable to do so, at their own homes.

The population of the parish, according to the census of the last year, was 139,454. The average number of paupers receiving parochial relief during the year, was 5679; of this number, 4050 received out-door relief; 1353 were inmates of the workhouse; and 276 inmates of the infirmary, including nurses and assistants.

The total expenditure for the year, L. 4305, 18s. 11d. Average number of paupers receiving medical relief daily, is as follows;—patients in the infirmary, 230; visited at home, 136; prescribed for at the infirmary, 163; workhouse patients, 102; total, 631, being an increase of 92 patients on the year 1480, as may be seen by reference to the report in the April number of the Edinburgh Medical and Surgical Journal, Vol. lvii. 1842. The expenditure for drugs, L. 531, 3s. 9d.; for wine and spirits, L. 178, 9s. 5d.; for surgical instruments, L. 77, 14s. 1d; salaries to medical officers, L. 369, 8s. 6d., being a decrease of L. 5, 13s. 1d. compared with the preceding year.

Diseases.	Years.	Seasons.							
		Dec. Jan. Feb.		Mar. Ap. May.		June, July, Aug.		Sept. Oct. Nov.	
		M.	F.	M.	F.	M.	F.	M.	F.
Digestive Organs.									
Inflammation,	1839	7	23	3	19	7	14	13	28
	1840	9	18	11	16	8	18	6	14
	1841	16	13	5	18	4	6	18	16
Ulceration,	1839	3	4	0	1	0	4	1	2
	1840	4	6	0	0	2	3	1	4
	1841	1	3	0	0	2	3	2	1
Diarrhœa,	1839	9	7	5	4	19	25	9	13
	1840	6	9	3	3	17	26	8	11
	1841	9	12	15	16	14	22	20	28
Dyspepsia,	1839	2	13	0	4	4	11	3	5
	1840	6	8	1	4	1	10	1	14
	1841	1	8	2	16	1	13	4	15
Colic,	1839	4	1	1	6	3	6	3	2
	1840	1	2	6	5	6	5	3	5
	1841	1	1	1	1	2	2	6	1
Worms,	1839	2	1	1	0	0	1	0	0
	1840	3	1	0	1	2	2	0	0
	1841	1	1	2	0	0	0	0	1
SURGICAL. Hernia, Fistula, and Piles,	1839	1	2	2	5	1	0	2	3
	1840	3	2	0	2	1	4	2	5
	1841	1	3	4	4	1	1	4	2
Diseases of Liver and Spleen,	1839	1	2	1	2	0	5	3	3
	1840	0	1	1	1	1	0	1	0
	1841	2	4	3	3	0	4	2	5
Poisoning,	1839	1	0	0	0	0	0	1	0
	Total,	94	145	67	131	96	185	113	178
Respiratory Organs.									
Inflammation of Lungs and Pleura,	1839	8	11	13	12	12	8	7	19
	1840	13	16	30	20	17	21	19	18
	1841	16	17	15	7	21	11	22	19
Inflammation of Air Passages and Asthma,	1839	33	51	15	27	5	13	13	30
	1840	36	40	16	21	8	7	24	31
	1841	45	58	27	34	15	16	27	40
Tussis and Catarrh,	1839	14	20	8	14	4	5	16	17
	1840	23	32	11	20	5	5	12	25
	1841	28	48	8	20	7	6	18	25
Pulmonary Consumption	1839	24	18	18	9	15	9	12	15
	1840	22	23	8	9	8	9	4	16
	1841	15	19	17	14	17	19	14	24
Hooping Cough,	1839	12	18	10	9	0	2	6	4
	1840	8	6	2	1	0	0	0	0
	1841	11	13	5	3	0	3	20	11
Influenza,	1839	1	1	2	5	0	0	0	0
	1840	4	16	2	3	0	0	0	0
	1841	22	62	22	75	0	0	0	1
	Total,	335	469	239	303	134	134	214	295

Diseases.	Years.	Age.				Results.				Total cases treated.	Propor. of deaths to cases treated.
		Under 7 years.	From 7 to 20.	Fr. 20 to 45.	From 45 & up.	Cured.	Relie. & Incu.	Admitted.	Dead.		
Digestive Organs.											
Inflammation,	1839	11	23	63	17	101	0	11	2	92	1 in 46
	1840	23	21	48	8	81	1	15	3	85	1 in 28
	1841	18	20	40	18	80	0	10	6	86	1 in 14
Ulceration,	1839	2	2	6	5	10	2	3	0	12	
	1840	4	2	9	5	17	0	1	2	19	1 in 9
	1841	2	1	3	6	10	0	1	1	11	1 in 11
Diarrhœa,	1839	36	5	29	21	79	1	3	8	88	1 in 11
	1840	25	4	36	18	76	0	3	4	80	1 in 20
	1841	35	12	40	39	129	0	4	3	132	1 in 44
Dyspepsia.	1839	0	3	22	17	37	3	2	0	40	
	1840	4	4	23	14	42	3	0	0	45	
	1841	4	1	40	15	57	0	3	0	57	
Colic,	1839	3	1	17	5	22	0	4	0	22	
	1840	1	8	16	8	29	1	3	0	30	
	1841	1	1	11	2	14	0	1	0	14	
Worms,	1839	4	1	0	0	5	0	0	0	5	
	1840	9	0	0	0	9	0	0	0	9	
	1841	4	0	1	0	5	0	0	0	5	
SURG. Hernia, Fistula & Piles.	1839	0	4	10	2	9	3	4	0	12	
	1840	1	1	9	8	14	3	2	0	17	
	1841	2	1	9	8	18	2	0	0	20	
Diseases of Liver and Spleen,	1839	0	3	10	4	9	4	3	1	14	1 in 14
	1840	1	0	3	1	2	0	2	1	3	1 in 3
	1841	1	1	9	12	11	5	3	4	20	1 in 5
Poisoning,	1839	0	2	0	0	0	0	1	1	1	1 in 1
	Total,	192	120	464	233	865	29	79	36	930	1 in 25
Respir. Organs.											
Inflam. Lungs & Pleura,	1839	39	13	23	15	58	4	9	19	81	1 in 4
	1840	68	19	39	28	107	0	19	28	135	1 in 4
	1841	49	20	44	15	89	0	15	24	113	1 in 4
Inflam. of Air Pass. & Asthma,	1839	15	7	52	113	87	68	31	11	166	1 in 15
	1840	19	6	52	106	61	72	38	12	145	1 in 12
	1841	6	7	79	170	103	110	31	18	231	1 in 12
Tussis & Catarrh,	1839	39	6	37	16	96	0	2	0	96	
	1840	52	18	49	14	133	0	0	0	133	
	1841	45	31	71	13	148	8	4	0	156	
Pulmo. Consump.	1839	4	13	76	27	0	32	48	39	71	1 in 2
	1840	0	18	76	17	0	38	35	26	64	1 in 2
	1841	1	14	91	33	0	65	39	35	100	1 in 2
Hooping cough,	1839	52	8	1	0	51	2	1	7	60	1 in 8
	1840	15	2	0	0	13	3	0	1	17	1 in 17
	1841	62	4	0	0	50	3	0	13	66	1 in 5
Influenza,	1839	4	1	3	1	7	0	2	0	7	
	1840	1	1	13	10	24	1	0	0	25	
	1841	13	42	81	56	177	0	12	3	180	1 in 60
	Total,	484	230	775	634	1193	408	286	236	1837	1 in 7

Diseases.	Years.	Seasons.							
		De. Ja. Feb.		M. Ap. May.		Ju. Ju. ly Aug.		Se. Oc. Nov.	
		M.	F.	M.	F.	M.	F.	M.	F.
Vascular System.									
Inflammation of Pericardium,	1839	0	0	0	0	0	0	0	2
	1840	0	0	1	0	0	1	0	3
	1841	0	1	1	0	1	0	2	1
Enlarged Heart,	1839	3	3	5	2	4	5	5	17
	1840	3	8	4	3	1	1	3	8
	1841	8	10	7	6	1	4	4	4
Aneurism,	1839	0	0	0	1	0	1	0	0
	1840	0	0	0	0	0	0	0	0
	1841	0	0	0	0	0	0	0	0
Inflammation of Veins,	1839	0	2	0	2	0	0	0	0
	1840	0	0	0	1	0	0	0	0
	1841	0	0	0	0	0	2	0	2
Diseased State of Blood,	1839	0	3	0	2	0	7	0	7
	1840	0	6	0	2	0	3	0	5
	1841	0	2	0	7	0	10	0	2
Hemorrhage,	1839	1	4	2	6	1	0	2	2
	1840	4	2	1	3	5	5	2	2
	1841	4	3	1	7	2	9	4	2
Uterine Hemorrhage,	1839	0	2	0	6	0	5	0	2
	1840	0	13	0	3	0	4	0	0
	1841	0	2	0	3	0	5	0	7
Dropsy,	1839	5	10	2	7	4	1	2	2
	1840	1	4	6	2	5	4	8	8
	1841	3	4	5	8	3	9	3	6
Scrofula,	1839	2	4	2	5	2	2	2	2
	1840	3	2	5	5	2	2	8	6
	1841	4	2	2	3	1	2	6	3
Cancer and Lupus,	1839	0	2	1	0	0	3	0	1
	1840	0	0	1	1	0	1	0	1
	1841	0	1	0	0	0	8	1	3
	Total,	51	104	58	101	45	110	59	107
Genito-Urinary Organs.									
Disease of Genital Organs,	1839	5	7	4	8	2	1	3	4
	1840	1	5	3	2	0	8	3	1
	1841	1	2	1	5	2	3	3	3
Disease of Kidney,	1839	1	1	4	0	0	0	1	1
	1840	0	1	1	0	0	3	0	0
	1841	2	1	3	2	1	3	0	3
Do. Bladder and Urethra,	1839	1	1	2	1	2	0	1	1
	1840	2	3	0	0	1	0	2	0
	1841	0	0	0	3	2	4	1	0
	Total,	13	29	18	23	10	33	14	26
Venereal,	1839	2	10	4	8	4	5	8	6
	1840	4	10	0	7	1	4	1	7
	1841	4	10	6	6	7	11	6	8
	Total,	10	30	10	21	12	20	15	21

Diseases.	Years.	Age.				Results.				Total cases treat.	Propor. of deaths to cases treated.
		Under 7 years.	From 7 to 20.	Fr. 20 to 45.	Fr. 45 & up.	Cured.	Relie. & Incu.	Admitted.	Dead.		
Vascular System.											
Inflam. of Pericar.	1839	0	0	2	0	2	0	0	0	2	
	1840	0	1	4	0	1	2	2	0	3	
	1841	1	0	5	0	3	0	3	0	3	
Enlarged Heart,	1839	0	1	22	21	17	40	11	8	33	1 in 4
	1840	0	0	14	17	0	19	6	6	25	1 in 4
	1841	0	2	15	24	0	32	10	2	33	1 in 16
Aneurism,	1839	0	0	1	1	0	0	2	0	0	
	1840	0	0	0	0	0	0	0	0	0	
	1841	0	0	0	0	0	0	0	0	0	
Inflam. of Veins,	1839	0	0	4	0	2	2	0	0	4	
	1840	0	1	0	0	1	0	0	0	1	
	1841	0	0	3	1	2	1	1	0	3	
Diseased State of Blood,	1839	0	5	12	2	16	1	2	0	17	
	1840	0	7	9	0	11	1	4	0	12	
	1841	0	12	8	1	18	0	2	1	19	1 in 19
Hemorrhage,	1839	1	1	13	3	13	1	4	0	14	
	1840	1	2	16	5	16	1	6	1	18	1 in 18
	1841	0	5	18	9	28	0	3	1	29	1 in 29
Uterine hemorrhage,	1839	0	0	15	0	13	0	1	1	14	1 in 14
	1840	0	3	17	0	18	0	1	1	19	1 in 19
	1841	0	0	14	3	15	1	1	0	16	
Dropsy,	1839	2	5	13	13	13	2	9	9	24	1 in 2⅔
	1840	1	7	15	15	11	10	9	8	29	1 in 3½
	1841	2	4	9	26	14	8	11	8	30	1 in 3¾
Scrofula,	1839	9	7	4	1	1	16	1	3	20	1 in 6⅓
	1840	22	8	3	0	3	18	4	8	29	1 in 3½
	1841	13	9	1	0	0	16	3	4	20	1 in 5
Cancer & Lupus,	1839	0	0	1	6	0	3	2	2	5	1 in 2½
	1840	0	2	2	0	0	3	1	0	3	
	1841	0	1	1	11	0	7	1	5	12	1 in 2
	Total,	53	110	276	196	287	178	103	67	532	1 in 8
Geni.-Urin. Org.											
Disease of Genital Organs,	1839	0	5	28	1	27	2	3	2	31	1 in 15½
	1840	2	4	14	3	19	1	3	0	20	
	1841	0	4	14	2	17	1	2	0	18	
Dis. of Kidney,	1839	0	0	6	2	3	4	1	0	7	
	1840	0	0	4	1	1	2	1	1	4	1 in 4
	1841	0	2	9	4	9	3	3	0	12	
Do. of Bladder & Urethra	1839	2	1	2	4	5	2	1	1	8	1 in 8
	1840	0	0	6	2	3	2	3	0	5	
	1841	0	6	0	4	6	2	2	0	8	
	Total,	4	19	119	24	118	20	23	5	143	1 in 28
Venereal,	1839	1	29	16	1	37	1	9	0	38	
	1840	0	12	20	2	27	0	7	0	27	
	1841	7	21	24	6	54	0	4	0	54	
	Total,	8	68	60	9	118	1	20	0	119	

Diseases.	Years.	Seasons.								Age.	
		Dec. Jan. Feb.		Mar. April, May.		June, July, August.		Sept. Oct. Nov.		Und. 7 years.	From 7 to 20.
		M.	F.	M.	F.	M.	F.	M.	F.		
Parturient diseas. Abortions, &c.	1839	0	2	0	0	0	3	0	8	0	2
	1840	0	3	0	0	0	6	0	1	0	0
	1841	0	3	0	2	0	2	0	4	0	1
	Total,	0	8	0	2	0	11	0	13	0	3
Nervous System.											
Neuralgia,	1839	3	4	3	6	4	2	1	0	0	6
	1840	0	2	1	10	1	5	2	3	0	5
	1841	3	0	2	4	1	3	2	3	0	2
Hysteria,	1839	0	5	0	10	0	12	0	11	0	16
	1840	0	15	0	11	0	12	0	12	0	17
	1841	0	24	0	8	0	9	0	10	0	31
Delirium Trem.	1839	0	0	3	0	2	0	1	0	0	0
	1840	1	0	1	0	1	0	0	1	0	0
	1841	0	0	0	0	0	0	1	0	0	0
Convulsions,	1839	2	0	0	0	3	2	1	3	9	1
	1840	1	1	2	2	4	2	1	2	10	3
	1841	2	3	1	2	0	0	3	2	10	2
Epilepsy,	1839	0	0	0	0	2	0	1	0	0	0
	1840	1	1	0	0	0	2	2	0	1	1
	1841	1	2	0	1	1	2	0	1	0	1
Insanity,	1839	5	12	3	6	5	4	4	8	0	8
	1840	7	6	3	7	2	4	3	4	0	3
	1841	1	5	3	2	3	4	2	7	0	2
Inflam. of Brain and Membranes,	1839	6	3	6	9	4	5	2	4	19	8
	1840	4	7	4	7	3	5	5	3	28	4
	1841	7	7	3	1	4	1	6	6	20	4
Chronic disease of Do.	1839	0	2	1	2	3	1	2	1	1	1
	1840	0	1	0	2	0	0	0	2	0	0
	1841	4	0	1	0	0	0	1	2	0	1
Apoplexy,	1839	0	1	2	1	1	0	2	7	0	0
	1840	3	2	4	3	1	3	2	3	0	0
	1841	0	0	0	0	1	3	4	6	0	0
Paralysis,	1839	2	4	2	1	0	2	2	3	2	1
	1840	0	1	0	3	4	3	5	4	0	0
	1841	5	2	4	0	3	8	2	5	0	0
	Total,	60	114	51	100	52	92	55	109	100	119

Diseases.	Years.	Age.		Results.				Total cases treated.	Propor. of deaths to cases treated.
		Fr. 20 to 45.	Fr. 45 & up.	Cured.	Relie. & Incu.	Admitted.	Dead.		
Parturient diseas. Abortions, &c.	1839	11	0	13	0	0	0	13	
	1840	10	0	9	0	1	0	9	
	1841	9	1	7	0	3	1	8	1 in 8
	Total,	30	1	29	0	4	1	30	1 in 30
Nervous System.									
Neuralgia,	1839	15	2	20	2	1	0	22	
	1840	17	2	18	2	4	0	20	
	1841	11	5	16	2	0	0	18	
Hysteria,	1839	21	1	28	6	4	0	34	
	1840	30	3	33	2	15	0	35	
	1841	20	0	48	0	3	0	48	
Delirium Trem.	1839	5	1	2	0	3	1	3	1 in 3
	1840	2	2	4	0	0	0	4	
	1841	0	1	1	0	0	0	1	
Convulsions,	1839	0	1	6	1	1	3	10	1 in 3
	1840	0	2	8	0	3	4	12	1 in 3
	1841	0	1	6	1	0	6	13	1 in 2
Epilepsy,	1839	1	2	0	3	0	0	3	
	1840	3	1	0	2	3	1	3	1 in 3
	1841	5	2	0	6	2	0	6	
Insanity,	1839	24	15	5	9	32	1	15	1 in 15
	1840	20	13	1	2	33	0	3	
	1841	19	6	2	0	24	0	2	
Inflam. of Brain and Membranes,	1839	8	4	21	2	4	12	35	1 in 3
	1840	3	3	17	2	4	15	34	1 in 2
	1841	9	2	17	1	6	11	29	1 in 2
Chronic disease of Do.	1839	3	7	7	4	1	0	11	
	1840	1	4	2	2	1	0	4	
	1841	4	3	0	2	4	2	4	1 in 2
Apoplexy,	1839	4	10	3	6	5	1	10	1 in 10
	1840	1	20	3	4	10	4	11	1 in 3
	1841	4	10	2	2	5	5	9	1 in 2
Paralysis,	1839	6	7	0	8	6	2	10	1 in 5
	1840	7	13	2	10	8	0	12	
	1841	11	18	10	12	6	1	23	1 in 23
	Total,	252	162	287	89	187	70	446	1 in 6

Diseases.	Years.	Seasons.								Age.	
		Dec. Jan. Feb.		Mar. April, May.		June, July, August.		Sept. Oct. Nov.		Under 7 years.	From 7 to 20.
		M.	F.	M.	F.	M.	F.	M.	F.		
Locomo. Organs & Cellul. Tissue.											
Inflam. of Bursæ and Periosteum,	1839	5	5	2	1	3	0	1	7	0	2
	1840	2	2	2	5	4	3	4	1	3	7
	1841	6	3	3	4	0	9	2	1	3	9
Diseased Bones and Cartilages,	1839	0	0	0	1	2	0	1	0	2	0
	1840	3	3	3	0	2	2	4	3	6	8
	1841	2	2	0	1	2	0	0	0	1	4
Dislocations and Fractures,	1839	0	4	2	4	2	1	2	2	1	3
	1840	3	3	1	2	3	1	1	1	0	1
	1841	5	4	3	3	6	1	1	2	0	3
Contusions,	1839	7	9	11	10	13	3	9	6	1	12
	1840	14	4	10	10	6	8	10	11	3	14
	1841	6	7	9	5	10	12	8	7	1	10
Rheumatism and Gout,	1839	36	29	32	27	15	16	11	12	1	16
	1840	42	23	31	21	17	20	28	31	0	17
	1841	60	30	32	22	33	26	31	28	0	28
Abscess,	1839	11	8	7	13	1	3	2	10	7	10
	1840	2	6	5	7	4	7	7	11	8	12
	1841	10	8	7	11	2	5	5	12	2	19
Ulceration,	1839	9	12	8	13	8	8	6	15	2	9
	1840	5	16	6	4	4	9	7	8	6	9
	1841	3	9	2	12	8	5	17	17	2	7
Gangrene, .	1839	0	0	0	4	0	0	2	2	2	3
	1840	0	3	1	0	6	0	2	1	4	3
	1841	1	0	0	0	0	0	0	2	2	0
Burns, .	1839	0	4	2	4	0	4	1	1	6	3
	1840	2	7	4	0	0	2	1	2	6	3
	1841	2	2	2	5	2	5	2	5	9	0
Chilblains, .	1839	0	0	0	1	0	0	1	0	0	1
	1840	0	0	0	0	0	0	0	0	0	0
	1841	2	0	0	0	0	0	0	0	1	1
	Total,	231	189	173	174	140	135	160	190	71	197
Skin Diseases,	1839	5	8	7	5	1	3	4	13	19	13
	1840	4	11	7	10	8	5	5	13	31	18
	1841	7	15	9	8	3	4	4	6	25	10
	Total,	16	34	23	23	12	12	13	32	75	41

Diseases.	Years	Age.		Results.				Total cases treat.	Propor. of deaths to cases treated.
		Fr. 20 to 45.	Fr. 45 & up.	Cured.	Relie. & Incu.	Admitted.	Dead.		
Locomo. Organs & Cellul. Tissue.									
Inflam. of Bursæ and Periosteum,	1839	13	9	17	2	5	0	19	
	1840	6	7	20	0	2	0	20	
	1841	11	5	20	1	7	0	21	
Diseased Bones and Cartilages,	1839	1	1	0	1	2	1	2	1 in 2
	1840	4	2	3	11	4	2	16	1 in 8
	1841	2	0	2	2	3	0	4	
Dislocations and Fractures,	1839	9	4	5	6	6	0	11	
	1840	8	6	10	0	4	1	11	1 in 11
	1841	13	9	21	2	2	0	23	
Contusions,	1839	30	25	62	1	5	0	63	
	1840	24	32	59	2	12	0	61	
	1841	34	19	59	3	1	1	63	1 in 63
Rheumatism and Gout,	1839	68	93	136	11	29	2	149	1 in 74
	1840	97	97	158	19	35	1	178	1 in 178
	1841	117	117	203	15	42	2	220	1 in 110
Abscess,	1839	29	9	46	0	9	0	46	
	1840	22	7	40	0	8	1	41	1 in 41
	1841	31	8	56	0	4	0	56	
Ulceration,	1839	34	34	61	8	15	0	64	
	1840	21	23	39	6	13	1	46	1 in 46
	1841	33	31	65	3	5	0	68	
Gangrene,	1839	1	2	5	1	1	1	7	1 in 7
	1840	1	5	6	0	6	1	7	1 in 7
	1841	1	0	1	0	0	2	3	1 in 1½
Burns,	1839	6	1	15	1	0	0	16	
	1840	2	7	16	0	1	1	17	1 in 17
	1841	10	6	25	0	0	0	25	
Chilblains,	1839	0	1	1	0	1	0	1	
	1840	0	0	0	0	8	0	0	
	1841	0	0	2	0	0	0	2	
	Total,	590	525	1060	95	219	16	1171	1 in 73
Skin Diseases,	1839	13	1	41	3	2	0	44	
	1840	7	7	57	3	3	0	60	
	1841	13	8	54	2	0	0	56	
	Total,	33	16	152	8	5	0	160	

Diseases.	Years.	Seasons.								Age.
		Dec. Jan. Feb.		Mar. April, May.		June, July, August.		Sept. Oct. Nov.		Und. 7 years.
		M.	F.	M.	F.	M.	F.	M.	F.	
Eruptive Fevers.										
Erysipelas,	1839	2	6	1	10	2	4	2	4	2
	1840	4	4	3	4	2	7	5	10	5
	1841	4	8	4	3	3	3	1	8	2
Measles,	1839	1	6	15	22	20	19	27	27	127
	1840	13	18	20	29	35	35	8	8	145
	1841	3	1	1	0	1	3	1	5	13
Scarlatina,	1839	10	5	7	7	14	14	19	15	57
	1840	4	13	12	12	15	22	5	5	53
	1841	5	3	7	14	7	12	21	22	57
Chicken-Pox,	1839	2	0	0	0	2	1	1	0	4
	1840	0	1	2	2	0	1	0	0	6
	1841	0	0	0	1	0	0	2	0	2
Small-Pox,	1839	4	2	2	4	1	0	2	0	12
	1840	3	2	1	1	6	4	19	16	44
	1841	16	29	4	5	1	3	3	4	50
	Total,	71	98	79	113	109	129	116	124	579
Fever,	1839	42	53	54	66	34	51	29	50	79
	1840	6	36	20	29	36	37	32	35	66
	1841	62	94	38	50	49	60	42	65	117
	Total,	142	183	112	145	119	148	103	150	262
Debility, &c.	1839	1	5	0	2	1	1	0	0	1
	1840	0	2	0	1	0	2	1	0	2
	1841	1	2	1	3	0	2	1	2	1
	Total,	2	9	1	6	1	5	2	2	4
Destitution,	1839	2	5	0	2	1	2	1	2	0
	1840	0	1	0	2	0	0	2	1	0
	1841	1	2	0	3	0	1	1	3	0
	Total,	3	8	0	7	1	3	4	6	0
Old age,	1839	0	4	0	1	0	1	0	4	0
	1840	0	4	0	2	1	3	1	5	0
	1841	1	7	1	12	0	2	0	2	0
	Total,	1	15	1	15	1	6	1	11	0
Unknown causes,	1839	0	1	0	0	0	0	0	3	0
	1840	1	4	0	2	1	0	0	0	0
	1841	0	0	0	2	0	0	0	0	0
	Total,	1	5	0	4	1	0	0	3	0
Aggregate,		1034	1447	839	1178	739	1023	871	1265	1862

Diseases.	Years.	Age.			Results.				Total cases treated.	Propor. of deaths to cases treated.
		From 7 to 20.	Fr. 20 to 45.	Fr. 45 & up.	Cured.	Relie. & Incu.	Admitted.	Dead.		
Eruptive Fevers.										
Erysipelas,	1839	5	17	7	21	1	7	2	24	1 in 12
	1840	4	21	9	29	1	9	0	30	
	1841	6	13	13	26	0	8	0	26	
Measles,	1839	9	0	1	133	0	1	3	136	1 in 45
	1840	17	2	2	147	0	1	18	165	1 in 9
	1841	1	1	0	13	0	2	0	13	
Scarlatina,	1839	27	6	1	83	0	3	5	88	1 in 17
	1840	23	12	0	77	0	6	5	82	1 in 16
	1841	32	2	0	78	0	1	12	80	1 in 6
Chicken-Pox,	1839	2	0	0	6	0	0	0	6	
	1840	0	0	0	6	0	0	0	6	
	1841	1	0	0	3	0	0	0	3	
Small-Pox,	1839	2	1	0	9	0	1	5	14	1 in 3
	1840	7	1	0	42	0	1	9	51	1 in 5
	1841	12	3	0	44	0	3	18	62	1 in 3
	Total,	148	79	33	719	2	40	77	798	1 in 10
Fever,	1839	88	175	37	289	3	69	18	310	1 in 18
	1840	76	92	29	195	2	55	11	208	1 in 19
	1841	107	181	55	382	0	60	18	400	1 in 22
	Total,	271	448	121	866	5	184	47	918	1 in 19
Debility, &c.	1839	3	0	6	8	2	0	0	10	
	1840	2	2	0	1	2	3	0	3	
	1841	2	7	2	7	4	1	0	11	
	Total,	7	9	8	16	8	4	0	24	
Destitution,	1839	2	6	7	0	10	5	0	10	
	1840	0	5	1	0	6	0	0	6	
	1841	0	9	2	0	9	2	0	9	
	Total,	2	20	10	0	25	7	0	25	
Old age,	1839	0	0	10	0	5	4	1	6	1 in 6
	1840	0	0	16	0	6	6	4	10	1 in 2
	1841	0	0	25	0	19	4	2	21	1 in 10
	Total,	0	0	51	0	30	14	7	37	1 in 5
Unknown causes,	1839	0	2	2	4	0	0	0	4	
	1840	0	3	5	4	0	4	0	4	
	1841	0	1	1	0	0	2	0	0	
	Total,	0	6	8	8	0	6	0	8	
Aggregate,		1342	2153	2039	5751	904	1180	561	7216	1 in 13

The number of males in the table, 3483; of females, 4913; total, 8396. Of this number 1180 were admitted to the Infirmary, Small-Pox Hospital, and a few to other hospitals, leaving 7216 which were attended at their own homes, and among whom 561 died, being a proportion of rather less than 1 in 13.

The mortality has been greatest among those suffering from diseases of the lungs, the number dead of consumption being 100, and the age at which it prevailed most was from 20 to 45. Inflammation of the lungs carried off 71, principally children under 7.

Next to chest diseases, the greatest mortality occurred among the sufferers from eruptive fevers, small-pox, measles, and scarlet fever; and again it fell upon children under 7. Small-pox prevailed during the autumn and winter of 1840 and the winter of 1841; measles prevailed from the spring of 1839 to the autumn of 1840; and it is curious to observe, that the ordinary laws governing epidemics have been departed from; the mortality was greatest at its termination. The great difference of severity in the visitations of scarlet fever is worthy of notice. In 1841, the mortality was 1 in 6, whilst in the other two years, it was 1 in 16 and 1 in 17.

Among the diseases of the brain, it will be seen that the mortality has fallen heavily on children under 7, in the form of inflammation of the brain and convulsions. Among the diseases of the vascular system, one would almost be disposed to place 12 deaths from apoplexy, diseases of the heart and blood-vessels being so frequently combined with it. The deaths from enlarged heart were 16; from dropsy, frequently combined with diseased heart, 25.

The deaths from fever amounted to 47, but the number of cases are unequally divided; in the year 1841, they were nearly double those of 1840, while those of 1840 were one-third less than 1839.

The mortality from diseases of the digestive organs was 36, and it fell principally among the very young, and the old, in the form of diarrhœa.

From scrofula there were 15 deaths. The number of cases in the year 1839 amounted to 2609, and in the year 1841 to 3156, being an increase of 547.

For the purpose of giving some idea of the places of abode and manner of living of a large portion of the pauper population, especially in the eastern division of the parish, it may not be considered out of place to state a few facts respecting a court named Calmel Buildings, situated in the close vicinity of Portman Square, principally inhabited by the lower orders of the Irish, the Hivites of the metropolis.

This locality is not chosen as affording a solitary instance of the wretched accommodation and the degraded state of society that necessarily follows amongst this unfortunate class.

The parish contains many localities much worse situated in every respect than the one above-mentioned. Take, for instance, Gee Court, in the same neighbourhood, leading out of Oxford Street, which is one of the principal thoroughfares in London, and in which occasionally such extreme cases of destitution and disease have occurred as would scarcely be credited. "Calmel Buildings" has merely been preferred as affording a good example of an almost purely pauper population, and as regards medical relief, one which is confined more to that received from the workhouse than perhaps any other of an equal extent in the parish.

Although there are such a number of medical charities in London, still the amount of relief they afford to the strictly-speaking pauper population is much less than might be expected, especially in a locality like the above, a number of the inhabitants of which are strangers, ignorant of the necessary forms of application for assistance, as no uniform system is adopted at such places, each being governed by its own bye-laws, known only to the few.

The Court is narrow, about 23 feet in breadth; the houses are three stories in height, surrounded and over-topped by the adjacent buildings; the drainage is most deficient; a common sewer running down the centre of the court is the receptacle for slops, &c. from the houses on both sides.

The lower apartments, especially the kitchens, which are under ground, are damp and badly ventilated, light and air being admitted through a grating on a level with the court. At all times, but particularly during the winter in many of them, a most offensive effluvium constantly exhaled; so much so, as to produce quite a sickening effect on the visitor. The houses are twenty-six in number, rented at an annual sum of from L. 25 to L. 30. Each contains ten rooms, which the renters of houses let out to families or individuals, who in their turn in many instances receive as lodgers those who are unable to bear the expense of a room. By such means, 200 or 300 per cent. in addition to the original rent is paid by the poorer class. According to the census of last year, the number of inhabitants was 944, of whom 426 were males and 518 females. Of this number, 178 were children under 7 years of age; 200 from 7 to 20 years; 457 from 20 to 45; and 109 from 45 years upwards. The number of persons in one house varied from two to seventy; one house was unoccupied. Occupations of the above as follows:

Males.				Females.	
Labourers,	215	Carter,	1	Servants,	51
Bricklayers,	7	Carpenter,	1	Market-women,	37
Shoemakers,	8	Shopkeepers,	6	Milk-carriers,	34
Tailors,	5	Schoolmaster,	1	Charwomen,	21
Farriers,	2	Sweep and scavenger,	2	Washer women,	10
Stablemen,	3	Errand boys,	9	Sempstresses,	10

Number of males, 261; of the females, 163. Total number of the working population, 424, leaving 520 without any occupation, the greater part of whom were children and old persons unfit to make any exertion for themselves, and depending solely on the industry of the others, a large number of whom, particularly the labourers, are frequently unemployed during the year.

The number of cases attended in each part of the house and results, were as follows:

	Cases.	Admitted.	Dead.	Proportion of deaths to cases.
In the kitchens,	39	2	3	1 in 13
parlours,	37	2	1	1 in 37
first floor,	60	3	2	1 in 30
second do.	69	7	3	1 in 33
attics,	64	1	3	1 in 21
Total,	269	15	12	1 in 22⅓

The mortality has been greatest among the occupants of kitchens. The cases have, however, not been so numerous in the kitchens and parlours as in other parts of the house, owing to a smaller number being inhabited, some of the latter being occupied as shops, and the former as store-rooms, and in one or two instances, the lower part of the house being converted into stables.

ART. V.—*On the period of Puberty in Negro Women.* By JOHN ROBERTON, late Senior-Surgeon in Ordinary to the Manchester Lying-in-Hospital.

IN a paper on the natural history of puberty in the female sex, in the different races of mankind, published in this Journal, Vol. xxxviii. I have attempted to show that we possess no credible evidence in support of an opinion, almost universal, that puberty is earlier in hot than in temperate and cold climates; and further, that there is reason to regard such an opinion as no better than a vulgar error.

That the opinion in question is entertained abroad equally as in our own country, the following passage from the physiology of Professor Muller, recently published, will sufficiently prove.—The period of puberty, the commencement of that part of life which is distinguished by the capability of propagating the species, does not occur exactly simultaneously in the two sexes; and still greater variety in this respect is caused by differences of nation and climate. Puberty declares itself in the female sex of our climate about the thirteenth, fourteenth, or fifteenth year, and is indicated by the occurrence of menstruation. In hot climates, the body undergoes the changes of puberty earlier than in cold climates.

It is stated that in the hot regions of Africa they take place in the female sex as early as the eighth year, and during the ninth year in Persia. Young Jewesses are also said to menstruate earlier than other females in our own country." Elements of Physiology, (translation), Vol. ii. page 1480.

In my paper before-mentioned, it is proved by a body of facts,* first, that the age of puberty, manifested by the appropriate sign, varies considerably in our own country; that, instead of the fourteenth and fifteenth years, as is commonly asserted, it occurs in a more extended range of years than authors have alleged; and that, while a certain small proportion of women arrive at puberty in the eleventh year, others have not reached it till eight or nine years later, namely, the twentieth year. In other words, that puberty is a phenomenon which varies in different constitutions—as much a constitutional peculiarity, in fact, as the colour of the hair or the form of the face; that while in a great majority of instances it is arrived at in the fourteenth, fifteenth, and sixteenth years, in a number of constitutions it is several years earlier, and in others a few years later, the occurrence of the phenomenon extending through a range of about nine years. In the second place, that the union of the sexes at an early age and early childbearing, so often noticed by travellers in warm latitudes, where there is a low state of civilization, are not owing to the women ripening earlier than in England, but depend on a variety of causes originating in ignorance and barbarism,† the chief of which are juvenile licentiousness, and preposterously early marriages; and that, did our standard of morals and social customs permit or encourage the same early union of the sexes in this country as takes place in those regions, instances of childbearing in the twelfth, thirteenth, or fourteenth year would be as common here as between the tropics; and, thirdly, that this explanation of the source of the fallacious notion which travellers and others have promulgated, is borne out by what we learn of the ages women marry and bear children at among the Esquimaux and other half-savage northern tribes; in the case of whom marriages are formed at ages quite as early as among the intertropical races. For the number and the nature of the facts adduced in proof of this opinion, however, I am obliged to refer to my paper in this Journal, already mentioned; except, I may state, that since its publication, I have noticed some facts in addition to what I had previously gathered as to the early ages of marriage among the Esquimaux, in the narratives of arctic voyagers. Thus, Sir John Ross in the journal of his second voyage says, referring to the Esquimaux women of Boothia Felix, with whose manners he had been long familiar, "All above thirteen years of age seemed to be married, and there appeared three or four such in every house, whether belonging to one establishment or not, we were not sure, but appearing to be the young wives in a house where there was one old one."—Page 251.

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* This refers to a table showing the age at which 450 women began to menstruate.

† A few centuries ago, juvenile marriages were not uncommon in Europe, the parties often marrying in infancy, and beginning to cohabit at or soon after the age of puberty. It would seem from various facts that the women were considered marriageable in the twelfth year; thus Matilda, wife of Prince William, son of Henry I. (who was drowned), was left a widow at the age of twelve years, six months after her marriage. In the reign of Richard II. the son of the Earl of Cambridge was married to the only daughter of the King of Portugal; the parties being only ten years of age. The father of the husband having withdrawn his son from Portugal, the lady was soon after given to John, King of Castile. Richard II. himself married Isabella, daughter of Charles IV. of France, in her twelfth year. By an arrangement between Edward IV. and the then Louis of France, Elizabeth, the daughter of the former, was to be married to the Dauphine when she completed her twelfth year. Richard, the son of the above Edward IV. was married in his fifth year to Ann, the daughter and heiress of John Mowbray, Duke of Norfolk. Again the niece of Richard III. Anne de la Pole, was affianced to the eldest son of the King of Scotland, the marriage to take place as soon as the parties arrived at puberty. The Princess Margaret, daughter of Henry VII. was contracted in marriage to James of Scotland, in the twelfth year. She remained, however, twenty months before removing to the house of her husband. Catherine, afterwards wife of Henry VIII. was married to Prince Arthur, and lived with him as his wife, when he was fourteen years old; and Henry, after his brother's death, married and lived with her when he had completed his fifteenth year. See Lingard's History of England, 12mo, Vol. ii. page 126; Vol. iv. pages 202 and 235; Vol. v. pages 232, 235, 283, 328, 335.

In the present essay my remarks are confined to a single race of mankind—the negro; respecting whose anatomy and physiology in general, there has long been controversy, and concerning no particular more, if not of controversy of vague and contradictory assertion, than with respect to the age at which the female reaches puberty. In my former paper will be found all the information which, after diligent research, I could discover tending to throw light on this subject of inquiry; but the amount is so little that I have recently set myself to obtain facts of a more decisive kind than are to be found in books, from persons living where there are negroes; and it will be seen, not without a good degree of success. After failing in attempts in various quarters, I was advised to apply to the two superintendents of the Moravian Missions in the islands of Antigua and Jamaica, on the ground that, besides the well-known readiness of the Moravian body to promote every good object, they had for a long period had registers of births kept at their mission stations, whereby these intelligent men would be able to furnish facts concerning the age of puberty more to be depended on than those of missionaries destitute of such records. Accordingly, I wrote to the Rev. Bennet Harvey and the Rev. John Elliott, superintendents of the missions just mentioned, and the following (which is the substance, not the precise words of my communication) will explain both what it was I wished to ascertain, and the manner in which the inquiry was to be conducted.

"Having long been desirous of procuring facts concerning the age of puberty in the negress, I am induced to apply to those who have the oversight of Christian missions, feeling persuaded that, if the intelligent missionary does not aid the physiologist in collecting information regarding the less known varieties of our race, help from other quarters is not likely to be obtained. In England, I find that some women begin to menstruate in the eleventh year, and others not till the twentieth, a great proportion commencing in the fourteenth, fifteenth, and sixteenth years of age, which proves that the period of puberty differs in different women; but a number of writers deny that negro women begin to menstruate at periods so late as the above; affirming, on what evidence I have not been able to discover, that they commence at the ages of eight, nine, and ten years. Now if it be true that the negress menstruates thus early, I should be glad to know it as an ascertained fact, or if it be erroneous to know, what is really the age of puberty in that race.

"It is not easy, I learn, to institute an inquiry such as this, owing to the difficulty of ascertaining ages with the requisite degree of exactness; an impediment which may probably, however, be obviated by a little care; since, I am told, the ages of a number of the negroes attached to the missions have been registered in infancy. If so, I should be glad to learn the ages at which fifty or (if more cannot be furnished) even so few as twenty negresses arrived at puberty; the main thing being to see that the fact in each instance is ascertained accurately. Twenty instances procured thus would be invaluable, though a larger number would of course be desirable. Unless, however, the negress's age in each instance is absolutely known, by reference to the register and stated in the returns, the latter will be of no value. The age when the menses appeared, it will generally be easy to find, as nearly every woman can tell regarding this point for herself, but the fact when practicable, should receive corroboration from the testimony of a mother, a sister, or other female relation or friend."

The above was dated June 1841. In a few months a reply was received from Mr Elliott of Jamaica, addressed to a friend in Manchester, acknowledging my letter, with a request to inform me that I might expect a communication as soon as he could make up what would be a sufficient number of cases. "Had he been satisfied with *opinions*," says this gentleman, "I could soon have answered him. My own opinion was that the females of whatever race arrive sooner at puberty in a tropical climate than in colder regions, but I only followed the opinions of others in this, and they probably based theirs on analogy between the animal and vegetable worlds. Experience proves that there is no such analogy." The latter remark refers to certain results he had even then obtained from the inquiry of a nature contrary to his anticipations.

In November the promised communication from Jamaica arrived.

"*New Carmel, Jamaica, Oct.* 18*th* 1841.

"The table on the first page of this sheet, I trust, will be useful to you in the investigation and promulgation of the subject mentioned in your communication of June 8th this year. I could have added many cases of negresses from eight to eleven years of age, in whom there is as yet no menstrual appearance. I believe you may rely on the accuracy of those you now receive. Wishing you and all who feel an interest in the too long degraded, traduced, and oppressed children of Africa, the divine blessing.—I am, &c.

Number of Negresses.	Age at present.	Age when the menses first appeared.	Whether the name be in register or not.
1	16	13	These seven names are not in our register, but have been kindly supplied by a proprietor, in whose estate's book they are registered, and whose accuracy may be depended upon.
2	36	15	
3	21	14	
4	46	14	
5	50	16	
6	22	14	
7	21	12	
8	22	15	In our register.
9	16	13	do.
10	16	15	do.
11	12	12	do.
12	13	Not yet.	do.
13	11	do.	do.
14	13	do.	do.
15	13	13	do.
16	14	Not yet.	do.
17	12	do.	do.
18	10	do.	do.
19	8	do.	do.
20	9	do.	do.
21	8	do.	do."

This table supplies evidence as to the age of puberty in the negress, both of a positive and negative kind. The positive evidence rests on twelve cases in which the menses appeared, in one aged sixteen years, in three fifteen, in three fourteen, in three thirteen, and in two aged twelve years; and the negative evidence rests on nine cases in which menstruation had not commenced, viz. in one aged fourteen, two thirteen, one twelve, one eleven, one ten, one nine, and two aged eight years. There is, we have seen, this further information in the letter, "I could have added many cases of negresses from eight to eleven years of age in whom there is as yet no menstrual appearance."

Five months subsequently, namely, in April 1842, I received another communication from Mr Elliott, inclosing a second table, the facts in which were collected not by himself but by another missionary. Mr Elliot writes, " I brought the subject of your request before the Rev. Mr Zorn, the president of our mission in this island, and (enclosed) transmit you the result of his inquiries, which. I have no doubt, will prove satisfactory, though not exactly according to your prescribed form."

It is evident from Mr Zorn's document that he has not fully apprehended the drift of my inquiries; a circumstance which, although it has rendered his replies in a number of instances incomplete, or rather, of little or no use, does not impair the great value of the remainder. The document is headed " Extracts from Church Book;" and these extracts are arranged in a tabular form in four columns. The first column furnishes the numbers of the names as they stand in the Church Book; the second the initials of the names; the third the dates of baptism, and the fourth column " whether or not they have menstruated in December 1841." At foot of the table is this note signed by Mr Zorn: " The above forty-two (instances) were taken as I could get information, without any design but truth. The idea of any (menstruating) younger than the above (under twelve years) was ridiculed by nurses. The date is of baptism, and a few may have been a year or two old at baptism; the great majority, especially of the younger ones, were baptised in infancy."

The results afforded by Mr Zorn's table, assuming that the year of baptism may stand for the year of birth, and we learn it does not in every instance, may be thus summed up.

One negress, baptised December 1827, menstruated first in November 1841, that is in her fourteenth year.

Fourteen * negresses, seven of whom were in their nineteenth year, one in the eighteenth, four in the seventeenth, and two in the fourteenth year, were found to have menstruated December 1841, that is to say, had past the period of puberty; how long past it does not appear from Mr Zorn's table. The consequence is no idea can be obtained as to the precise age of puberty in these fourteen cases.

Twenty-seven negresses had not yet reached the period of puberty as shown by the natural sign, menstruation, whose ages, December 1841, were one in her twentieth year, stated (as " healthy"); two in the seventeenth, (" healthy"); six in the sixteenth; seven in the fifteenth; five in the fourteenth; five in thirteenth; and one in the twelfth year, in all twenty-seven.

Of positive evidence, as to the age of puberty in the negress,

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* One is stated as being a mulatto; also of these fourteen, one negress in the eighteenth, and two in the sixteenth year of age, are said to have each " one child."

Mr Zorn furnishes one case where the individual first menstruated in the fourteenth year of her age; and of negative evidence, a body of twenty-seven cases, the particulars of which it will not be necessary for me to recapitulate, only I may remark that negative evidence, provided the females are healthy, and there is no reason to doubt of there being so in the present instance, is to the full as valuable and conclusive as any positive evidence whatever.

From Mr Harvey, island of Antigua, I had an answer in the beginning of the present year to the following effect:

December 3, 1841.

"In reply to your inquiries forwarded to me some months ago, I beg now to inform your that, in pursuance of the objects proposed in your communication, I lost no time in referring them to Dr Nicholson of the firm of Musgrove and Nicholson of this island, as the best method I could adopt for your purpose, and that having given the subject his candid attention, as I have been aware of his doing ever since it was submitted to his consideration, he has furnished me with a reply, which is herein inclosed, and which is the best answer I can possibly return to your queries."

The letter of Dr Nicholson here referred to, to the Rev. Bennet Harvey, is as follows:

St John's, December 1, 1841.

"I am very sorry that I have failed in my attempt to procure the information Mr Roberton desires, and which I believed and led you to expect I should have been able to obtain with the utmost facility. My disappointment has been occasioned by various causes. In the first place, the records of births which, previous to emancipation, were accurately kept in every estate, have been lost or destroyed since 1834, and therefore it is no easy matter to ascertain the ages of young females of that class. With the assistance of the ministers and baptismal registers, I believe this obstacle might have been overcome, had not another of still greater importance occurred, which I have as yet been unable to remove. When I began my inquiries I stated, perhaps imprudently, but for the purpose of satisfying them of the purity of my motives, that the information sought was required by one of their ministers who was much interested in their welfare. To this circumstance I attribute chiefly my complete failure. They began to suspect that my object was to discover their immoral practices, which I am sorry to say I have reason to believe, are begun at a very early age, long before the natural signs of puberty are developed. The mothers either denied all knowledge on the subject, or gave such answers as convinced me that no dependence could be placed in any thing they said. At present, therefore, Mr Roberton must be content with the bare result of my experience, derived from upwards of nineteen years practice in this island; and although I possess no written record of individual cases, I consider the general result to be as accurate, as if it had been drawn from documents of a more authentic appearance.

"*First*, I have never met with a case of menstruation before the twelfth year, either in whites or blacks; but I have met with a few cases at that age, both in whites and blacks, and in the mixed race. That such cases are rare is proved by the fact of my having been consulted professionally on account of that circumstance.

"*Secondly*, menstruation commences most frequently in the fourteenth or fifteenth years; and I know no difference in this respect between the whites and blacks; but cases of tardy menstruation from chlorosis, are more frequent with the latter: this I do not attribute to any constitutional difference existing in these races, but to local causes affecting the individual, such as miasmal effluvia, to which the blacks are more exposed. In such situations the young males are subject to a disease termed Mal de' Estomac, the pathology of which is similar to chlorosis.

"*Thirdly*, I have never met with a case of pregnancy occurring before menstruation had appeared, but I have been told that such has been the case in this island; and I met lately with two cases in which the first conception took place whilst the patients were labouring under suppression of the catamenia.

"*Fourthly*, a regular monthly discharge during pregnancy, in every respect resembling the catamenia, is not an unfrequent occurrence in this island, particularly with the whites of a sanguine temperament.—I remain, my dear Sir, yours very sincerely, THO. NICHOLSON."

This able and valuable letter, and the still more valuable tables from Jamaica, the facts and opinions though derived from three independent sources agreeing in a remarkable manner, call for no further comment or explanation. I venture to hope that the evidence they supply will be thought sufficient to settle this long disputed point regarding the supposed earlier maturity of negro as compared with white women—to settle it for ever in the negative, or, let me say, till opened afresh by the authority of well-ascertained facts. At the same time, this evidence may help to cast doubt on other popular notions of a similar kind, as that the sexual feelings are naturally less under control in warm countries than in our own; that the intellect of the dark varieties is naturally inferior to ours, and many more, which, while they are little creditable to the good sense of those who entertain them in the absence of all proof whatever, exercise an ill influence on public opinion in our varied relations and intercourse with and treatment of the coloured races in our colonies. For, how trifling soever erroneous opinions such as these may appear to be, when viewed apart from their consequences, every one read in the history of European intercourse with intertropical nations knows that their influence with reference to whites and blacks alike has been, in more ways than one, extremely pernicious.

In conclusion, I may be permitted to allude to the vague notions still existing both in and out of the medical profession as to the effects of certain mental and physical circumstances in hastening or retarding puberty in the whites of Europe; for example, that working in heated factories accelerates it; that the state of manners which exists in populous cities has a similar effect; and that it is later in women of the peasantry than in the inhabitants of cities, especially the higher orders. If all this be true, where is the evidence? I believe it is yet to be collected. With regard to the alleged forcing effects of cotton factories on the female constitution, I can testify from inquiry that it is destitute of truth. And, perhaps, it would not be unjust to rank the whole of these opinions as entitled to about equal credit, (at all events as equally in need of proof, and probably as equally incapable of receiving it,) with that curious scrap of natural history to be found in Herodotus, Thalia cviii., Beloe's translation—"The lioness," says the venerable father of history, "of all animals the strongest and most ferocious, produces but one young one in her life, for, at the birth of her cub, she loses her matrix. The reason of this seems to be, that, as the claws of the lion are sharper by much than those of any other animal, the cub, as soon as it begins to stir in the womb, injures and tears the matrix, which it does still more and more as it grows bigger, so that at the time of its birth no part of the womb remains whole."

ART. VI.—*On the Physiological and Medicinal Properties of Bromine and its Compounds; also on the Analogies between the Physiological and Medicinal Properties of these Bodies, and those of Chlorine and Iodine, with their correspondent Compounds; being the Harveian Prize Essay for* 1842. By R. M. GLOVER, M. D. Edinburgh, Newcastle on Tyne.

BROMINE and some of its compounds are known to possess great energy of action on the animal system. The element and many of its compounds are interesting from the chemical analogies which they offer with well-known medicinal agents. Exact and beautiful chemical relations subsist between chlorine, bromine, and iodine, and between their compounds. Hence, a more complete investigation than has yet been recorded of the physiological and medicinal properties of bromine, and of the mode in which they are affected by combination of the element with other bodies, must appear likely, besides the more particular results, to contribute to the solution of a problem of the highest interest, viz. the extent to which the chemical analogies of bodies are accompanied by analogy of action on the living system.

Generalizations of the kind alluded to are valuable as guides in therapeutics on account of the great difficulty which exists in ascertaining the effects of remedies. Having before us as data, the possession of certain physiological and medicinal properties by chlorine and iodine, and their respective compounds, and the existence of bromine and its compounds in a definite chemical position between the two other classes of bodies, we then find for the group which more immediately concerns us a physiological place corresponding analogically to that which is held by it chemically, and we make use of the physiological relations which we have discovered as guides in the therapeutic part of our inquiry. If we do not thus dispense with the necessity of trying the medicinal properties of some of the bodies, we at least gain points of elevation whence to view the medical facts that may occur; or obtain useful guides and illuminating beacons amidst the obscure and contradictory evidence so often furnished from the treatment of disease.

The idea of a relation between the chemical and physiological properties of bodies, similar to that which exists between the external forms of many plants and the action of the same plants on the animal economy, has been more than once expressed. Mr Blake, in his laborious and ingenious researches into the action of inorganic bodies introduced into the circulation, endeavours to connect the physiological properties of the bodies with their chemical relations viewed through the medium of the doctrine of isomorphism. In the present crude state of this doctrine, it appears to me more satisfactory to take into account the broad chemical analogies of bodies than their relations solely as to crystalline form. If some isomorphous bodies are similar in physiological action, there are others between which it would appear difficult to trace any great resemblance; for example, the compounds of arsenic and phosphorus.* Mr Blake's statement, that the properties of a base are but little modified by combination with the strongest acids, if true, appears somewhat in contradiction with the prominence which he attaches to isomorphism as a guide to the physiological action of substances, for isomorphism is frequently to be traced as much produced by the acid as by the base. *Non omnia possumus omnes;* and it seems to me that the valuable researches of Mr Blake fall short of what this great question requires, since their author confines the chemical part of the question on the one hand, and that which relates to physiology on the other. He takes into account almost exclusively the effects of substances introduced directly into the circulation; and many salts which are very different in general physiological properties, thus introduced, appear to produce very similar effects. Thus he has been led to connect potassa and its salts physiologically with ammonia and its compounds, rather than with the series of soda salts, which last named group he places beside the salts of silver, following in this respect the isomorphous relations as guides. Now, in general chemical properties, potassa, and soda, with their respective salts, are more allied than are the compounds of sodium and silver, and I venture to assert, that this also holds good physiologically. In this inquiry I am most fortunately situated, for, not only are there beautiful chemical analogies to be traced throughout the group of halogenous elements and their compounds, but in general the chloride, bromide, and iodide of a base are isomorphous.

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* I have experimented on rabbits with arsenic and phosphoric acids, and the alkaline arseniates and phosphates. Four grains of arsenic acid dissolved in two measured drachms of water and introduced into the stomach of a stout rabbit, killed the animal in four hours, with symptoms of strong irritant, and corrosive action and also of affection of the nervous system. Fifty grains of glacial phosphoric acid in the same quantity of water similarly administered to a rabbit supposed equivalent to the other, produced no effect. Great difference also appears to exist between the action of the alkaline arseniates and phosphates, so given to rabbits, the former being more irritant and acting more powerfully on the nervous system. These are, however, I conceive, exceptional cases: but such exceptions are probably very numerous.

Although desirous to avoid all chemical details, which are foreign to the subject, I proceed to indicate some of the leading chemical and physical analogies of this interesting group, for they have a distinct bearing on the inquiry.

In the first place, we are struck by the remarkable analogies of physical character in the elementary bodies, which may in general be traced in a modified form throughout the long series of compounds. Thus, at ordinary temperatures, chlorine is a light-green coloured gas; bromine a liquid of a splendid red colour; iodine a solid with an intense shade of violet. And the volatility of their respective compounds in general follows in each case the rule of the element. Hydrochloric acid is the most volatile of the three hydracids, and hydriodic acid the most fixed. The chloride of potassium is volatile at a brown red heat, while the iodide requires a much more elevated temperament.* Chloride of cyanogen is gaseous at ordinary temperatures when the bromide and iodide of the same substance are solid. The chlorides and bromides of olefiant gas and formyl are liquid, but the corresponding iodides are solid. The compounds of bromine are frequently of a deeper hue than those of chlorine, but the compounds of iodine are generally of the deepest shade of all. Nay, the respective specific heats of these bodies preserve a relation. It will be observed, in the tables given in the recent researches of M. Regnault on the specific heats of compound bodies, that the specific heats of bromides are less than those of chlorides, and greater than those of iodides of the same bases.[*] The three elements all undergo modifications of form by slight changes of temperature and pressure. Chlorine becomes a liquid under the comparatively slight pressure of four atmospheres. Bromine, which freezes at 10°, boils at 116° 5′, and iodine is melted and volatilized by a slight elevation of temperature.

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* Berzelius, Traité de Chimie, T. iii. p. 374.

Even the chemical equivalents of the elements exhibit the same traceable connection; the equivalent of bromine being nearer that of chlorine than it is to the equivalent of iodine. And passing from chlorine to bromine and iodine, we find their affinity for electro-positive bodies represented by hydrogen to decrease, while the affinity for electro-negative bodies represented by oxygen increases, which may be illustrated under the following heads:

1. Bromine does not, like chlorine, combine directly with hydrogen under the influence of solar light, although a small quantity of a mixture of bromine and hydrogen may be made to unite on introducing a red hot wire. It is still more difficult to combine iodine directly with hydrogen.[†]

2. Nitric acid decomposes all the three hydracids, but the hydrobromic and hydriodic acids are decomposed likewise by sulphuric acid.

3. Chlorine and bromine act more powerfully on organic matters than iodine, which pre-eminence they appear to owe to their greater affinity for hydrogen; they rapidly act upon alcohol, giving rise to the production of chloral and bromal, while iodine may be kept long in this fluid, before much effect ensue.

4. Iodine being more electro-positive than the other two elements, does not in every case dispossess oxygen from an electro-positive metal, which may be the reason why, in some cases, it forms iodides of oxides, where they create bleaching compounds.[‡]

5. Chloride of iodine and chloride of bromine are decomposed by alkaline solutions, with formation respectively of a hydrochlorate and iodate, and hydrochlorate and bromate, but the bromide of iodine is so decomposed with the result of a hydrobromate and iodate being obtained. Under the same head may be placed the difficulty of concentrating chloric and bromic acids on account of

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[*] Ann. de Chimie, T. i. série iii.

[†] Balard, Ann. de Chimie, T. xxxii.

[‡] I have observed a fact with regard to the action of bromine on one metallic oxide, which I have not seen noted. When solution of bromine in water is added to solution of nitrate of oxide of silver, a precipitate is formed, and the solution acquires the smell characteristic of the bleaching compounds of chlorine. On filtering the solution, it yields a further precipitate after filtration, and bleaches strongly and continues to furnish more precipitate for several days. The nature of the action is doubtless similar to that of chlorine on solution of nitrate of silver, or on red oxide of mercury. A hypobromous acid or a bromous acid must be formed.

their tendency to decomposition, while iodine holds its oxygen more tenaciously.

6. Chlorine decomposes the bromides and bromine the iodides of electro-positive metals; but when we get to the electro-negative metals, there are indications of a tendency to inversion of these affinities. Thus iodine, heated along with calomel in water, gives rise to the formation of red iodide of mercury and corrosive sublimate; and hydrobromic and hydriodic acids decompose the terchloride of gold.

Among other remarkable relations between the halogenous elements may be mentioned their association together in the sea and its productions. I may here state incidentally, that I have found another instance of the coexistence of these bodies in a salt spring, that of Birtley, in the county of Durham, where bromine and iodine exist in very appreciable quantity.

On the whole, we may conclude from the chemical facts which I have thus connected, that bromine is more allied in chemical properties to chlorine than to iodine.

The subjects of this paper may be conveniently arranged as follow:—1*st*, Of the Physiological Properties of Bromine and its Compounds—the Hydrobromic Acid, Bromides of Potassium, Sodium, Magnesium, Barium, Zinc, Iron, Mercury, Cyanogen, and Olefiant Gas, with Bromoform, and of the analogies which they offer with Chlorine and Iodine, and their correspondent compounds, some of which we shall have to examine where they appear to need investigation; 2*d*, Of the Medicinal part of the Inquiry; 3*d*, General Conclusions.

Part. I.—Physiological Properties of Bromine and its Compounds.

All substances which can exert a chemical action on component parts of the tissues of organized beings, and therefore, when applied to them, cause a physical lesion, must be irritant, or capable of giving rise to a series of phenomena which appear in such cases to be partly of a reactive character. The first question that we have to ask, therefore, regards the power of bromine to act chemically on the tissues. The exact nature of this action is yet obscure. Beyond the mere fact of the coagulation of albumen by bromine, but little information on this subject is to be found in works.* Indeed, great doubt may be entertained with regard to the nature of the action of all corrosive substances on the animal tissues. Thus, while Mulder describes a series of regular atomic compounds formed by the action of acids on albumen, such as the sulpho-proteic acid, $Pr + SO_3$ Dr Samuel Brown maintains that the action of acids on albumen is altogether catalytic.† If we look to the analogy of chlorine, we have the chloro-proteic acid of Mulder. In the few facts that I have to relate on this head, there is yet something which bears on the inquiry.

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* See Ann. de Chimie, T. xxxii. Raspail, Systeme de Chimie Organique, p. 201. Berzelius, Traité de Chimie, T. viii. p. 63.

† Edin. Academic Annual for 1840.

According to Balard, "bromine readily attacks organic matters, such as wood, linen, and especially the skin, which it colours strongly yellow; the tint which it communicates is less intense than that given by iodine, and disappears like it at the end of some time, but if the contact has been of some duration, only with the remains of the epidermis."* "In these circumstances," says Berzelius, "water is decomposed, the oxygen is carried to the organic substance, and the hydrogen forms hydrobromic acid with the bromine." It is not easy to see how, on the coagulation of albumen by bromine, a bromo-proteic acid could be thus the sole resulting compound.

When white of egg is coagulated by bromine, either pure or in solution in water, the colour of the element is lost. The coagulum is soluble in solution of caustic potass with or without the aid of heat. From this solution we can readily obtain evidence of the presence of bromine. If without dissolving the coagulum, we wash it on a filter with distilled water, the liquid that passes assumes a faint blue tinge, and is a solution of a small quantity of albumen in dilute hydrobromic acid. The coagulum cannot, however, be thus absolutely deprived of its bromine. Conceiving the existence of a chloroproteic acid to be altogether hypothetical, since Liebig, Dumas, and Mulder, all vary in formularizing protein, and no chlorous acid of the composition $Cl\ O_3$ has been proved to exist in combination with any other base, I prefer explaining the changes described, by supposing that compounds of albumen, with bromine and hydrobomic acids, exist in the clot, the albumen serving as a feeble base; but when we wash the clot, these acids decompose each other, and a weak solution of albumen in hydrobromic acid passes the filter. Or this action might be regarded as a case of double catalysis, the bromine being enabled to decompose water by the presence of albumen, and the albumen coagulated by the presence of the bromine.

It may be questioned whether the action of metallic salts on albumen be not closely allied to that of acids. M. Lassaigne has controverted the notion of Orfila, and others, that metallic salts are necessarily decomposed when they act on albumen.† If we cannot wash the chloride of mercury from albumen, which it has coagulated, by water, we can remove it unchanged by means of ether.

A small quantity of bromine will not coagulate more than a certain amount of white of egg, nor will the latter substance change the colour of an indefinite quantity of the former. The medium degree of saturation appears to be attained when 96.25 of solid ingredients in white of egg are added to 23.31 of bromine.

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* Bromine let fall on the arm speedily raises a blister, and if allowed to remain will soon effect greater mischief.

† Ann. de Chimie, T. lxiii. Same author in Journ. de Chim. Medicale, Mars 1840.

The action of hydrobromic acid on albumen presents a most beautiful analogy with that of hydrochloric acid. When white of egg is put into concentrated hydrobromic acid, it is at first coagulated, but by repeated agitation in excess of the acid it is dissolved, and with more facility by the aid of heat. The result is the formation of a deep-coloured solution, not of a deep indigo blue tint, as in the case of hydrochloric acid, but of a brownish purple hue.

There is great difficulty in bringing about a similar effect by pure bromine and white of egg. On heating and agitating large quantities of bromine in succession with white of egg and a little water, I obtained a strongly acid greenish coloured solution with a deeper coloured coagulum at the bottom.

When bromine in water is placed in contact with fibrin, the latter substance is converted into a bluish gelatinous looking body. The same circumstances are observed of fibrin in this state as of albumen coagulated by bromine.

A solution of colouring matter of the blood is coagulated by bromine, the hue of the mixture becomes olive green, and ultimately gray if excess of the element be employed. And it may not be without interest to observe that, on washing the coagulum, the iron of the blood is removed, and yet, when the washings cease to give evidence of containing iron, a large excess of bromine having been employed, the precipitate left on the filter, on being boiled with solution of caustic potass or soda, will give a colour nearly resembling that of the blood. This fact may be adduced in connection with the argument of M. Scherer, who has sought to prove that the colour of the blood is not entirely dependent on its iron.

Bromine exerts an action on the fatty principles of the tissues, and appears to be transformed into hydrobromic acid at their expense. The compounds formed are probably analogous to those so formed by chlorine.

Desire of brevity induces me to omit the detailed history of previous investigations into the physiological properties of bromine and its compounds; the results of these investigations are to be found in many elementary works. Sufficient evidence has been adduced by former investigators to show that the primary action of bromine introduced into the stomach, or into the circulation, bears considerable resemblance to that of chlorine or iodine, in so far as either of these bodies can be similarly administered.

The following facts, ascertained by former investigations, may, however, be stated with advantage, M. Balard, the discoverer of bromine, observed that a drop of it placed on the beak of a small bird soon produced death. Barthez found ten or twelve grains of bromine dissolved in a sufficient quantity of water to occasion death when injected into the jugular of a dog. A single fit of tetanus only preceded death. Sometimes in such an experiment death did not take place, but there were restlessness, dilated pupil, frequency of the pulse, and sneezing Blood-letting after the commencement of the symptoms favoured recovery in such cases. The following sentences from Devergie give a summary of what had been observed of the effects of bromine introduced into the stomach of animals. "Introduced into the stomach (of the dog) in a dose varying from thirty to forty drops, according to the state of the organ in regard to fulness, it causes death, and gives rise to the following symptoms:—nausea; attempts to vomit, vomiting, acceleration of the respiration and circulation, prostration going on augmenting till death, which takes place at the third or fourth day. *Pathological alterations*; more or less marked injection of the villous coat of the intestinal canal, corrugation of this membrane in the stomach; now and then grayish superficial ulcers; in some cases sufficiently evident softening." Butske found that a dog died in a few days after taking only "five grains dissolved in a few ounces of water, and the symptoms were laborious breathing, loud cries, and convulsions. In the dead body he found the stomach internally chequered with bloody mucus, the duodenal mucous membrane universally injected, but the rest of the intestinal canal in a healthy state."* I may observe that there must be some mistake in this statement,—five grains of bromine dissolved in a few ounces of water being quite incapable of killing a dog when introduced into the stomach.

These effects have much resemblance to such as have been observed to arise from the similar administration of chlorine and iodine. Iodine when introduced into the stomach of the dog produces the same prostration; the same kind of death without any phenomenon of general excitement. "After death we find numerous blackish ulcerations of the villous coat, sometimes surrounded with a yellowish areola along with general injection of the mucous membrane of the intestinal tube."† In animals killed by the injection of chlorine water into the stomach, the villous coat is also found blackened and ulcerated.‡ The introduction of tincture of iodine into the veins scarcely furnishes a fair comparison with the effects of pure bromine or those of the same substance dissolved in water. But effects are thus produced bearing some resemblance to those following the administration of bromine.§ Devergie, neverthelss, is not warranted in stating broadly that bromine has the same physiological action as iodine, at least from the facts before him. Where are the proofs that bromine can exert so powerful an action on the secretory and excretory organs as iodine is known to possess? This is part of the question for investigation.

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* Christison. † Devergie.

‡ Dictionnaire de Matière, Médicale, Art. Chlore.

§ It is odd, that while Dr Cogswell found two drachms of tincture of iodine injected into the veins of a dog almost immediately fatal, Magendie gave a drachm without

Bromine is better fitted for physiological experiments than chlorine or iodine, since we can administer it pure or dissolved in water. The exact solubility of bromine in water is nowhere stated. According to my experiments, at the temperature of 60°, one part of bromine is soluble in 41.23 of water, so that a fluid-ounce of a solution of this strength, being what I understand by a saturated solution, would contain about 10.36 Troy grains of bromine.

No experiments have been made on the action of bromine on vegetables. In a large dose it must be destructive to plants on account of its chemical effects on their tissues. In a very minute dose it may prove stimulant to vegetation, as has been asserted, and denied of chlorine and iodine.

Expt. 1*st*. A gold fish, placed in a mixture of one part of saturated solution of bromine and two parts of water, had its whole surface immediately corroded, and life appeared to be extinct in less than a minute. Another fish placed in water tinged faintly yellow by bromine had the respiration quickened and apparently rendered more laborious. This animal showed no other signs of excitement and died in an hour; its surface was corroded; the gills of both were congested.

Expt. 2*d*. Four drops of bromine* were placed on the bill of a pigeon; the effects were corrosion of the bill where the bromine was placed; violent excitement of the bird followed by an apathetic state; death in two days, owing to corrosion and irritation of the air passages produced by inhalation of the fumes of the bromine.

Expt. 3*d*. By a suitable contrivance four drops of bromine were introduced into the external jugular of a strong male rabbit. He immediately shrieked; the respiration became laborious; the pupils were dilated; the heart's action quick and violent, but ceased after a few irregular beats; there were two or three convulsive struggles, and the animal was dead in seventy seconds from the performance of the operation. On opening the chest immediately, the irritability of the heart was found to be destroyed. The substance of this organ was corroded near the apex; and there were several marks of corrosion in the lung. The blood in the right ventricle and pulmonary artery was coagulated and corroded. Contractility of the voluntary muscles remained.

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any effect, and says, he found no other effect from solid iodine introduced into the stomach of dogs than vomiting.

* Bromine is about three times as heavy as water.

Expt. 4th. A middle-sized bull and terrier bitch, strong and active, had an ounce of solution of bromine containing two and a half minims of the element injected into her jugular by a glass syringe; the symptoms were panting and tumultuous action of the heart, a spasm of opisthotonos followed by a terrific yell and escape of the urine and fæces. After the spasm had subsided, having lasted about a minute, the animal gave several heavy inspirations, and the heart's action was felt very feeble and irregular; the pupil was observed greatly dilated. General tremors of the muscles occurred before death, which was preceded by a deep inspiration, and took place within a second or two of three minutes from the period at which the solution was injected.

On inspection, the voluntary muscles contracted strongly when cut. The heart was gorged with black coagulated blood in its right cavity and with red fluid blood in its left, and was irritable five minutes after death. The lungs collapsed on opening the chest and appeared healthy.

Expt. 5th. A strong fox-hound, a year old, lamed, had half an ounce (by measure) of saturated solution of bromine injected into his jugular. After the operation he was seized with a fit of panting, which lasted nearly two minutes. After this both respiration and circulation were observed to be quickened. In seventeen minutes after the operation, he became affected with coryza and sneezing. Then rigors came on. During the first hour he passed fæces repeatedly. For some hours he continued feeble, and as if suffering from a pulmonary affection, but eventually to all appearance he recovered, and in three days after was again experimented on.

He had thirty drops of bromine introduced into the jugular of the side not operated on before; and as the fluid did not descend but coagulated the blood in the vein and destroyed the surrounding parts, an ounce of the saturated solution of bromine was thrown in afterwards. As soon as the solution entered, the animal gave a loud yell; the heart's action became violent and irregular, and the respiration of the same panting character that had been before remarked. Then followed violent movements succeeded by prostration and manifestations of suffering. Seventeen minutes after the operation he made efforts to vomit, and began to void blood from the mouth. The pupil was now greatly dilated. The animal appeared to possess perfect consciousness. He died in an hour and a quarter from the performance of the operation, having repeatedly voided blood from the mouth, and passed urine and fæces; death was preceded by great feebleness of the heart's action and muscular debility.

The most remarkable appearances after death were found in the lungs and stomach. The lungs presented a splendid appearance of congestion, and several apoplectic-like spots; slight pressure caused blood to flow from almost every part of the pulmonary tissue. The bronchi contained frothy blood, and in several places were occupied by strings of coagulated blood. On cutting near the border of the right lung, there appeared a vessel filled with yellowed and corroded blood, and around the pulmonary tissue contained much blood. The stomach contained about half-a-pint of grumous blood; the mucous coat was much injected, and presented several large ecchymoses; one of which near the cardia appeared to have been the chief source of the blood. The rectum exhibited marks of vascularity.

Remarks.—Bromine introduced directly into the circulation appears to exert a corrosive and irritant action on any organ to which it may be directed. In the fourth experiment we see it producing death by coagulating the blood, and so obstructing the circulation. The sudden stoppage to the circulation through the left side of the heart, and consequent compression of the nervous centres, may account, as shown by Mr Blake, for the nervous symptoms which occur in such cases.* The state of the stomach after death, in the experiment just related, may, perhaps, be accounted for by supposing that this organ affected since the first operation, was unable to withstand the sudden congestion it would undergo from obstruction to the circulation through the right side of the heart in the second operation. It is easy to see how blood-letting may remove some of the symptoms occasioned by the injection of bromine into the veins.

Expt. 6. Sixty minims of bromine were poured down a flexible tube into the stomach of a strong female cat. For two minutes no effect was perceptible. Then the respiration and circulation became greatly quickened; inspiration being somewhat prolonged, but expiration made with rapidity, and accompanied by a wheeze. Saliva began to drop from the mouth, the eyes to water, and in the course of four or five minutes, clear fluid was running in a constant stream from the mouth and nose. About the fifth minute, the animal began to struggle violently, and made repeated efforts to vomit, but did not succeed in vomiting. The heart's action became very irregular, and after terrible convulsions, death took place in seventeen minutes from the time at which the poison was administered.

The appearances were all those of the most violent corrosion and irritation. The mucous membrane of the stomach would be separated in rose-coloured flakes. The lining membrane of the gullet was as if filled with a minute red injection. The appearances of corrosion were not confined to the digestive organs, but extended to the air passages and lungs. The peristaltic action of the intestines was stopped, and the small intestines had completely lost their tonicity. A more detailed account of the appearances is unnecessary, because the relation of the next experiment will show better the peculiarities of the corrosive action of bromine, and we may infer, of the halogenous elements generally in a high dose. In the present case, no proof was obtained of the absorption of the poison.

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* Ed. Med. and Surg. Journal, No. cxlviii. p. 121.

Expt. 7th. Two measured drachms of pure bromine were given to a strong and active terrier-dog in the mode related in the last experiment. For seven or eight minutes after the operation, he manifested no emotion. He then began to draw his belly along the ground, and then vomited matter which evolved fumes of bromine, and seemed to excite a disagreeable sensation in the mouth. For about an hour, the symptoms were of this character; occasionally fæces were passed, and there were frequent tremors, cries, and other expressions of pain. These symptoms gradually subsided, and he remained in a state of stupor, occasionally moaning; the respirations heavy and heart's action feeble. His death took place about five hours and a half after the operation. The inspection was not made until some hours had elapsed.

The lungs were found with several large spots towards their roots, and infiltrated with frothy serum. The blood was dark-coloured and coagulated on both sides of the heart. The peritoneum contained a dark-coloured semifluid matter, feebly acid, and exhibited many marks of inflammation. The greater part of the stomach had been dissolved, leaving only some blackened shreds attached to the duodenum, and another portion at the cardia, which might amount to a third of the organ. This part was marked with long black striæ, and presented a space near the entrance of the œsophagus where the mucous membrane was deeply injected. The mucous membrane of this remaining part was gelatinized, the remaining peritoneal coat was tinged blue, somewhat more of it was left than of the other coats. Great part of the lining membrane of the gullet was reddened and thickened. The duodenum and small intestines presented appearances altogether different from those offered by the stomach. The duodenum was yellowed internally by the poison, and retained a strong odour of bromine, which was not the case with the stomach. The mucous membrane of the duodenum, although thickened, felt harder that natural, and rather brittle, but was covered with a large quantity of matter which appeared to be the secretion of the bowel acted on by the poison.* On cutting the jejunum or ileum across the walls of the tube did not collapse. The mucous membrane of these intestines was much thickened, and in the superior portion had a white and granulated aspect. At the inferior part of the small intestine, the mucous membrane was thickened and softened, and began to exhibit traces of vascularity, which were very distinct in the sigmoid flexure and rectum, where there was little or no corrosion. The colon was empty. The lower part of the liver was corroded and of a bluish colour. The membranes of the brain were vascular.

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* See Plate I. for a representation of these states of the stomach and duodenum.

A careful analysis of the heart and its contents showed that bromine had been absorbed into the blood.

Remarks.—Two series of effects are produced by the introduction of bromine in large doses into the stomach. We have the action due to volatilized bromine getting into the fauces and air-passages, and so into the lungs, and the corrosive and irritant action on the stomach and intestines. Another series of effects might be due to the entrance of bromine into the circulation. To the first series must be referred the coryza, sneezing, salivation, and affection of the respiration. The solution of a great part of the stomach in the seventh experiment, may be accounted for by supposing that, after a time, the stomach became unable to transmit its contents into the duodenum, when the bromine remaining in the organ becoming converted into hydrobromic acid dissolved the coats. The intestines being not so well adapted for the lodgement of the poison, the appearances they presented differed from that of the stomach, being the effect of the element, and not of the hydracid. An experiment will be afterwards detailed, in which it will be found that hydriodic acid dissolves a portion of the stomach. The peculiar blue colour appears characteristic of the action of the hydracids on this organ, and resembles the appearance of the stomach, showing the action of the gastric juice after death, as given in Carswell's plates. I could not, as has been related, exactly imitate the process which I suppose to have taken place in this experiment, by acting on white of egg by bromine.

The absorption of hydrobromic acid is corroborated by numerous analogical facts. Chlorine and sulphuretted hydrogen pass into the urine, * also arsenious acid; and I shall afterwards bring forward evidence of the absorption of the acid bichloride of mercury. The hydracids of chlorine, bromine, and iodine are peculiarly likely to be absorbed, since the two former form soluble compounds with albumen, and we may assume as much of the other.†

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* Becquerel, Séméiotique des Urines, pp. 128–180.

† In my essay, given in for competition on the 1st of January, I stated this absorption of hydrobromic acid, the argument above given in favour of the absorption of other acids, and the evidence of the absorption of corrosive sublimate. Orfila announces in a letter of very recent date (See Echo du Monde Savant, 28 Avril 1842) that he has now established the absorption of muriatic, nitric, sulphuric, and oxalic acids. As yet he has given no details. He has also detected mercury in the urine. The absorption of the oxacids may be accounted for from their compounds with albumen being soluble in a large quantity, the absorption of corrosive sublimate is explained by its compound with albumen being soluble in solution of the electro-positive chlorides. (May 12th.)

Expt. 8th. A strong male rabbit had ten mimims of pure bromine introduced by a flexible tube into his stomach. No particular effects followed the operation. Three days after this, he was poisoned by prussic acid, when the mucous membrane of the cardiac portion of the stomach was found reddened, somewhat thickened and softened, and dotted with numerous minute white spots of corrosion.

Expt. 9th. Another rabbit like the former had the same dose administered in the same manner. Three hours after the operation, the respiration was wheezing, and saliva flowed from the mouth. He got well, and was killed a week after by prussic acid. An ulcer of the size of a shilling, of a triangular shape, was found near the cardia.

Expt. 10th. Two ounces by measure of a saturated solution of bromine were injected into the stomach of a stout male rabbit. Death took place in five minutes and a few recent symptoms, tetanic convulsions, a peculiar rapid movement of the fore-legs; after this pulse slow and feeble, respiration slow and forcible, pupils at first contracted, afterwards dilated, salivation just before death.

Chief appearances after death ; bloody froth in the mouth and air passages ; several apoplectic spots towards the roots of the lungs ; heart not irritable three minutes after death ; blood dark and fluid in both cavities. The mucous membrane of the stomach was of a white and corroded aspect over the greater part of the organ, deeply injected at the depending part. The same appearances extended to the duodenum. The epithelium of the stomach came off in washing the organ.

Expt. 11th. Half the quantity of the solution of bromine given in the former experiment was administered to a strong male rabbit. Death took place in a quarter of an hour. Symptoms ; loss of power over the voluntary muscles ; breathing became embarrassed and made with great muscular effort ; frothing at the mouth, and violent convulsions like those described in the preceding case.

The appearances were in general similar to those observed in the former experiment. The left side of the heart contained dark clotted blood. In both these cases the voluntary muscles contracted, and the peristaltic action continued. No evidence of the absorption of bromine was obtained from the analysis of the organs.

Expt. 12th. In this case the introduction of two measured ounces of the saturated solution of bromine into the stomach of a rabbit gave rise to a different train of symptoms. The solution was introduced in two portions, the second dose being given five minutes after the first. An hour after the operation, he was affected by coryza and salivation. This was at 6 P. M. Next morning at nine he was found lying on his side, the eyelids closed, respiration slow and forcible, accompanied with a slight wheeze; pulse scarcely perceptible; the fore legs were regularly moved towards the head, and these brought back; some flow of saliva; the animal heat low; death took place about five o'clock.

In this case no corrosion was found in the stomach, but very curious marks of irritation. The stomach, which was contracted, on a little semidigested food, showed its cardiac portion of a deep purple hue separated by a distinct line of separation from the pyloric portion, which was pale and œdematous. The epithelium was removed, and the mucous membrane over the cardiac was occupied in several places by irregular patches of ulceration. The same disorganization was exhibited in the upper part of the small intestines. The blood was coagulated in the abdominal veins and ascending cava; the heart pale and empty.

The blood collected from the veins gave evidence of the presence of the poison.

Expt. 13*th.* Two strong male rabbits had each two ounces by measure of the saturated solution of chlorine in water introduced into the stomach in the usual way. Forty hours after this the animals were poisoned by prussic acid. The stomach of one was found with its villous coat inflamed, and softened over the cardiac portion; that of the other, in addition to this general appearance, had three somewhat oval green-coloured ulcers with the mucous membrane around them deeply injected. One of these near the pylorus was about half the size of a sixpence; another of about twice this size next the œsophageal opening; and the largest, about as big as a shilling, was opposite this, at the lowest part of the cardiac sac.

Expt. 14*th.*—Forty grains of finely levigated iodine were suspended in an ounce (by measure) of water, and injected into the stomach of a stout male rabbit. Then an ounce of water was thrown down the tube, with the view of washing all the iodine into the stomach. Death took place in half-an-hour.

Symptoms.—Loss of power over the voluntary muscles; dilated pupil; slowness and feebleness of the heart's action; slow and forcible respiration; salivation. Shortly before death the animal ran suddenly into a corner, where it was found extended on its side. The respirations were now ten in the minute; and each was attended with a convulsive shudder.

Inspection.—The voluntary muscles contracted on being cut; the auricles of the heart moved five minutes after death; the lungs were congested, and contained much frothy serum; both sides of the heart contained dark fluid blood; the stomach, on an external view, showed its vessels much congested; the mucous membrane was much corrugated; and over the cardiac portion presented an appearance like cork corroded by iodine, with deep-red coloration in the centre of the depending part; the bladder was full of urine, which contained no iodine.

Remarks.—Bromine is more irritant when diluted than when pure. It is an irritant independent of its corrosive action; the effects of chlorine and iodine introduced into the stomach of rabbits closely resemble those produced by bromine considering certain modifying circumstances. The experiment last related is, I believe, the only one on record where an animal is killed speedily by the corrosive and irritant action of pure iodine. Supposing the chemical affinities of the halogenous elements for albumen to be the same, which I have already shown is not in all probability the case, an equal quantity of chlorine should be more powerfully corrosive than bromine, and the latter body than iodine, because of the difference in their chemical equivalents.

Expt. 15*th.* A lively terrier dog, about five months old, had three ounces by measure of the saturated solution of bromine introduced into his stomach by a flexible tube, the penis being secured by a ligature. Three minutes after the operation he vomited much frothy mucus and a little semidigested food; the vomited matters exhaled vapours of bromine. Repeated vomiting of bloody mucus and purging succeeded. This state continued an hour, the animal manifesting great uneasiness. After this he lay in a state of great feebleness, but did not appear to suffer from pain. Half-an hour after the operation, the ligature was removed from the penis. He forthwith passed urine which, on analysis, was found to contain bromine. Urine passed four hours after the operation gave no proof of containing the poison. Next day he seemed recovered, and the same dose was again administered; effects similar; less vomiting. The day after this second dose he had another; after this he could not retain his food. Two days after this third dose he was found completely prostrated; the respirations abdominal; heart's action slow and feeble; pupils dilated; salivation; body cold; death was preceded by stupor and frothing at the mouth.

On inspection the stomach exhibited several mottled erythematous like patches. There was a distinct line of separation between the cardiac and pyloric portions; the former presented an appearance of softening, and had assumed a yellowish hue except in the site of the patches described. It had also lost its epithelium in several parts. The pyloric portion was red, contracted, and rugose; the lungs, which were slightly affected with tubercle, were infiltrated with bloody serum, and partly with a purulent secretion. Black coagulated blood was found in both sides of the heart; no bromine could be detected on analysis of the blood and organs.

Expt. 16*th*. A middle sized mongrel dog had two ounces, by measure, of the saturated solution of bromine introduced into the stomach. He passed fæces almost immediately. In the course of an hour the respiration became affected; salivation, coryza, and retching ensued. About the third hour the symptoms had subsided. This dog had the above-mentioned dose given every second or third day for a month, *i. e.* time was allowed for the irritation of one dose to subside before another was given. During this time he got very thin, was much purged, and acquired a great appetite.

Expt. 17*th*. Eight drops of bromine were placed on the tongue of a small mongrel dog; he made efforts to reject the poison, the fumes of which were disengaged from the mouth. In the course of a few minutes the respiration became doubled in rapidity, inspiration being accompanied with a mucous rattle and expiration, attended with wheezing and hiccup. The respirations gradually became slower, and the heart's action irregular. He passed fæces repeatedly, and retched violently; the mouth and eyes watered; the pupils became dilated; the animal, after these symptoms had subsided (after having lasted about an hour) became greatly depressed.

Remarks.—The last series of experiments were intended to exhibit the effects of the inhalation of bromine vapour, and those which are manifested on the *primæ viæ*, independent of the corrosive action, and further, to test the rapidity of the absorption of the poison, and possibly to throw some light on the question of its cumulative action, which we cannot but ask in regard to a substance so nearly related to iodine. The purgative action of bromine is sufficiently evident on dogs, but something similar is produced by almost all irritant and corrosive poisons. We might fancifully ascribe the vomiting and purging which take place in such cases to efforts of the *vis medicatrix naturæ*. It is shown that bromine passes speedily into the urine, and we may also infer from experiment 15th, that it is thus removed from the system. Every thing that has yet been observed with regard to bromine seems to show that, besides its primary action and the effects of the irritation thus induced, which may be repeated so as to accumulate the deleterious influence on an animal, there can be no proper cumulative action. Compare experiment 16th with experiments on the cumulative action of iodine.* The dose of bromine administered was as great as could be given without inducing excessive irritation, which would defeat the end in view.

There is similarity between the effects observed to proceed from the inhalation of chlorine, and those which are detailed in the last experiment as occasioned by bromine.

This appears to be the proper place to relate the observations of M. Fournet on the physiological effects of bromine, which were manifested on some patients affected by chronic arthritis, to whom bromine was administered by him, then an interne under Andral.* The remedy was given suspended in mucilage. The dose was at first two drops, but was raised by two drops daily, until it amounted to sixty drops in the twenty-four hours, which should be sufficient, in a treatment of three months, to afford a good example of the action of the substance. The quantity of mucilage employed to suspend the substance was always four ounces. Two drops thus taken occasioned only a hot sensation in the back of the palate. " In a little stronger dose, the patient experienced in a quarter of an hour, itchings in the hands and feet, and shocks in the feet and near the knees. A quarter of an hour after these first sensations he had borborygmus and colic. During the night the sensations in the hands and feet were now and then repeated. As the dose became stronger, there was a sensation of heat in the chest, accompanied with attempts to vomit, but without any vomiting. At first a peculiar sensation of weakness and fatigue in the chest accompanied these first efforts, but as the patient became habituated to the preceding phenomena, these symptoms disappeared. The patient who experienced these itchings in the fingers was always the most sensible to the effects of the bromine. A quarter of an hour after ten drops were taken, he complained of a sensation as of enormous weight, on the stomach, with desire to vomit, colics, and gargoillements. An hour after, he had a feeling of tightening from the shoulders, to beneath the elbow, on each side, as if these parts had been compressed in a vice; these lancinating pains were felt in the fingers and circumference of the head; but these symptoms disappeared, and the patient enjoyed a remarkable degree of calm. Every day, at each administration of the remedy, the preceding symptoms were renewed. At length there was joined to them a feeling of shooting pain round the orbits. The shocks which the bromine determined on traversing the digestive tube became greater with each increase of dose. This shock was followed by a feeling of heat internally, which lasted for about ten minutes; and was greatest when the bromine was on the point of entering the stomach. When the dose became forty-five drops, the sensation of acidity and burning which followed the administration of the remedy was so violent, that the patient exhibited for some time a convulsive state of the face and members. Then he experienced an inclination to vomit but never vomited. In five minutes these symptoms disappeared, and his ordinary state returned. After this crisis he experienced no other disagreeable sensation. The appetite was good, the digestive functions unimpaired, his fatness and appetite increasing.

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* Bulletin General de Therapeutique Fevrier, 1830.

The writer of this paper took the watery solution of bromine for a month. The dose was at first forty drops of the saturated solution in half a tumbler of water with a little syrup, three times a-day. This was increased to half a wine glassful of the solution, which was as much as could be taken at a time. The taste in the palate after the taking of this dose was truly horrid. Slight pain in the stomach was sometimes felt. The appetite improved, and there was slight action on the skin and kidneys; but he experienced more notable effects; "a drop and a-half of bromine in half an ounce of water gave him heat in the mouth, œsophagus, and stomach, followed by colicky pains. Two drops occasioned nausea, hiccup, and increased secretion of urine." Tranz, by breathing the vapours, had "violent cough, and a feeling of suffocation, followed by headach." Of these effects, I have had abundant experience.

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* Bulletin General de Therapeutique, Fevrier 1830.

The tonic and diuretic effects of bromine were experienced by a syphilitic patient of mine, who took the solution. Mr R. Fentress, of this town, having given a glandered horse five ounces of the saturated solution of bromine twice daily, observed increase of the appetite of the animal. After death, we found the villous coat of the stomach and intestines in a healthy state.

An observation on the nervous system is manifested by bromine; dilated pupil and stupor occurred in several experiments. And in an experiment where I injected solution of bromine into the peritoneum of rabbits, the same symptoms were observed along with the peritoneal inflammation which killed the animals. Large doses of hydrochloric acid have occasioned somewhat similar cerebral affection in man.*

M. Fournet relates that frictions of bromine produced an erythematous eruption, preceded by a prickly sensation. Mr Wallace describes a similar effect as proceeding from the application of chlorine gas to the skin.†

On the whole, there can be little hesitation in placing bromine intermediate in physiological properties between chlorine and iodine, but more nearly related to the former than to the latter body.

TESTS AND ANTIDOTES FOR BROMINE.

This part of the inquiry has no other interest but what a rational spirit of scientific investigation can confer. The tests for bromine in general require the presence of the element to be manifested by the peculiar colour of the body. There is, however, an exception to this rule in a new test which was suggested to me by my friend, Dr George Wilson, viz. the chloride of gold; the solution of this salt giving a red tinge with hydrobromic acid or an electro-positive hydrobromate.

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* Pereira, Mat. Med. Part. i. p. 153.

† Wallace on Chlorine, p. 99.

When bromine exists in an organic mixture, since it is sure to be in a state of combination, caustic potass should be added to the mass, which should then be reduced to an ash, exhausted by distilled water and chlorine, passed through the solution, or the chloride of gold added to it previously carefully neutralized by hydrochloric acid. When chlorine is used, starch may render the presence of the element more perceptible. I have tried experiments on the relative delicacy of tests, and prefer the chloride of gold. Nitrate of silver is a delicate test where the bromine is not mixed with chlorine; the bromide of silver is distinguished from the chloride, by heating with hydrochloric acid, and chlorite of lime, when ruddy fumes are evolved if bromine be present.

M. Barthez has proposed magnesia as an antidote for bromine. From experiments to be related, it will appear that the bromide of magnesium is by no means an active salt; neither is it inert. From experiments performed on rabbits, I conclude starch in solution and white of egg to be excellent antidotes to the poison.

PHYSIOLOGICAL PROPERTIES OF HYDROBROMIC ACID.

Expt. 18*th.* Five minims of bromine, partly dissolved, partly suspended in an ounce by measure of water, were converted into hydrobromic acid, by means of sulphuretted hydrogen, and being freed from sulphur, an excess of sulphuretted hydrogen was injected into the external jugular of a terrier dog selected to correspond with the subject of the fourth experiment. The symptoms which resulted were strong, quick, and irregular action of the heart, and a curious succession of fits of panting, occurring at intervals of three or four seconds, and lasting each time for ten or twelve seconds. This state endured for about twenty minutes, the animal remaining pretty quiet, but before the expiry of this time, the fits were not so frequent as at first. In two hours he was quite well.

Expt. 19*th.* 80 grains of the bromide of barium dissolved in water, were decomposed by dilute sulphuric acid in the way I have elsewhere recommended;* and thus a solution of hydrobromic acid in seven fluid drachms of water obtained, which, according to the tables of Berzelius, would give 95.958 grains of bromine in the form of the hydracid. This solution was then injected into the jugular of a cur bitch of middle size. The symptoms were an immediate spasm of opisthotonos with escape of urine and fæces, loud cries, and frothing at the mouth. The tetanic spasm lasted a minute and a-half. After it subsided, the respiration was slow and forcible; the heart's action slow and feeble; death took place in three minutes from the commencement of the operation. The heart was found gorged with dark clotted blood in both cavities. The irritability of the organ remained after death. The blood in the heart did not redden litmus; the urine contained bromine.

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* Philosophical Magazine, No. 121, Third Series.

Expt. 20th. Ninety minims of bromine in two ounces of water being converted into hydrobromic acid, half-an-ounce of the solution was introduced into the stomach of a stout male rabbit. Effects,—restlessness; quickened respiration and circulation; great uneasiness manifested; and now and then a sharp cry; loss of power over the voluntary muscles; discharge of urine; slight convulsions; death in ten minutes from the administration of the poison.

The most remarkable appearances were, congestion of the lungs, which were infiltrated with frothy serum, and with a few apoplectic spots in their tissue; the bladder was full of urine; the whole of the mucous membrane of the cardiac portion of the stomach exhibited a uniform gray erosion, was much softened, and had the epithelium removed.

Expt. 21st. Two fluid ounces of saturated solution of bromine were converted into hydrobromic acid solution and given to a rabbit, without any effect being produced.

Expt. 22d. Three drachms of iodine were suspended in two fluid ounces of water, and nearly all converted into hydriodic acid by sulphuretted hydrogen. An ounce of this solution was introduced into the stomach of a strong male rabbit. At first the motions of the animal were quickened, but in the course of seven or eight minutes they became feeble. The respirations at the end of this time were panting. At the tenth minute there was partial loss of power over the inferior extremities. At the fifteenth minute, he moved a little and passed urine. At the twentieth minute he lay on his belly; the hind legs outstretched; the heart's action very feeble. After this he was in a state of complete prostration, but apparently conscious; the animal heat declining rapidly. Death took place in an hour and forty minutes from the administration of the poison.

On inspection immediately, there was no contractility of the voluntary muscles; no movement of the heart (which was empty) on the application of stimulus; nor peristaltic action of the intestines. The stomach was largely perforated, or rather dissolved at the cardiac extremity and greater curvature, and that portion which remained was of a blue colour, and had several pieces of semicoagulated blood at its surface. The small intestines exhibited marks of corrosion and irritation; the colon was full of fæces; the bladder empty and contracted; the peritoneum contained a quantity of dark-coloured fluid blood.

Remarks.—These experiments show that hydrobromic acid is less powerfully corrosive and irritant than the element. The last experiment confirms the statement made some pages back with regard to the capability of hydrobromic acid to dissolve the coat of the stomach. A comparison between experiments 4th and 19th will show that hydrobromic introduced into the blood is less energetic than bromine. The effect of the hydrobromic acid in coagulating the blood in Expt. 20th corresponds with what is related of the effect of hydrochloric acid similarly administered.

Dr Buchanan maintains that all the beneficial effects due to the administration of iodine are owing to the conversion of the element into hydriodic acid, which passes into the system, and that the primary irritant action is due to the element alone.* In the rabbit poisoned by hydriodic acid, I found that the iodine was retained in the tissues by a base, since they could be charred, and the iodine detected in them without the necessity of having recourse to caustic potass. According to Rees, the iodine is sometimes converted into iodic acid in the system,† which is according to the view I have given of the action of bromine on albumen to which that of iodine corresponds, as I have ascertained, though this latter action is of a more feeble character. The refuted existence of iodate of potass in the urine, where the hydriodate has been taken internally, may receive some elucidation from facts which I shall afterwards bring forward tending to show that the activity of salts depends, in great part, on the facility with which they undergo decomposition in the system.

The hæmadynamometer, which has been so recommended in physiological experiments of the kind related, and so much used by Mr Blake, was not employed in the experiments on bromine and hydrobromic acid, because both these bodies must obstruct the circulation in the capillaries of a part to which they may be sent, on account of their chemical action on the blood and the walls of the vessels.

(To be concluded in next Number.)

Art. VII.—*Case of Pimelitis.* By Railton Gill, M. D. Licentiate to the Royal College of Surgeons, Edinburgh, Surgeon to the Hexham Dispensary.

David Williamston, aged 40, of robust appearance, and great muscular power, residing in a low damp situation, surrounded with tan-yards, and bark heaps, had been under the care of a person, at one time of considerable practice, in this neighbourhood, for seven or eight days, for the relief of shooting pains in his back, which he thinks had been produced by continued exposure to cold during the storm of January last. He had been bled to a great extent; and purgatives had been exhibited when I was requested to attend him. The services of the above individual were discontinued, although I requested the contrary; and I could not urge them, as it was not likely I should meet him, for reasons which need not here be mentioned.

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* Med. Gazette, Vol. xiii. p. 515.

† Rees on the Analysis of the Blood and Urine, p. 88.

February 10th. The patient had first observed the swelling about twenty-four hours before my visit, which rapidly spread over the whole limb as high as the axilla; when pressed upon, it feels in some places hard, in others soft and boggy, as if containing purulent matter, so much so, that I made an incision in one place, but caused only a discharge of reddish-coloured lymph. There is excruciating pain with a numb feeling when the parts are moved. Pulse 80, weak; countenance haggard and anxious; vertigo and tendency to syncope on raising the head from the pillow. The tongue was furred and dry.

℞. *Calomelanos,* ʒss.; *Opii Pulv.* gr. ii.; *Creta Prep.* ℈ii. *Mis. divide in Pulv.* vi., *capt.* i. *quaqua* 4*ta hora.*

The bowels to be regulated, if necessary, with the colocynth and hyoscyamus pill. One or two draughts containing full doses of the camphor mixture, and nitrate of potass, with liquor of acetate of ammonia were taken at bed-time, to combat jactitation and typhomania. For diet, arrow-root and beef-tea were allowed, with small quantities of ale or porter for drink. The limb was enveloped in a poultice of linseed meal, and slightly elevated.

February 14th. Symptoms continued the same, excepting slight aggravations at night; a regular perseverance in all the remedies at the same time being conjoined until to-day, when the gums became sore from the mercury, and severe dysenteric symptoms succeeded.

Omittantur remedia omnia.

℞. *Tinct. Opii* ʒss.; *Vin. Ipecac.* gtt. xv.; *Potass. Nitrat.* gr. v.; *aq. font.* ℥i. *Ft. haustus subinde sumendus.*

16th. Swelling has been rapidly decreasing, the whole of large subcutaneous veins feel greatly distended, and as hard as if filled with wax; pulse 65; tongue moist; anorexia, but free from vertigo and anxiety; respiration slower and less hurried; purging occasionally slight, but relieved by the opiate.

℞. *Infus. Cinchon.* lb.i.; *Quininae Sulphat.* gr. viii.; *Sodae Carb.* ʒii. *Solve. Ft. mist. capt. cyathum ter in die.*

20th. Continues improving *Repetatur Mist. Tonic. et habt. Ol. Camphoratum pro linimento.*

26th. All disease nearly removed; the veins can no longer be traced with the eye or fingers; a slight numbness of the little finger remaining. Ordered a generous diet and gentle exercise in the open air.

March 8th. Quite well, rapidly gaining flesh, having lost during his illness about eighty or ninety pounds Avoirdupois.

His wife, whose case I have not mentioned, is convalescent from a severe attack of typhous fever, which was ushered in about the 14th of February during my visit in the morning. By the immediate abstraction of about ten ounces of blood with the lancet, subsequent leeching, blistering to the neck, and cold applications to the head with mercurial alteratives, and senna and gentian as a purge, with wine towards the thirteenth day, she has recovered. I only mention this preliminary to my remarks on the case of her husband, as it may corroborate any supposition towards finding out the usual predisposing causes of pimelitis.

Remarks.—That the case was one of diffuse inflammation of the adipose tissue, I think no one can doubt; but that the veins were likewise inflamed, appears equally certain. Whether the veins were first affected, or the adipose tissue was earliest inflamed, and which of the two became subsequently the seat of concomitant affection, extending to the other, is somewhat equivocal. But, from the peculiar situation of the residence of the patient, from some slight inflammation in the adipose tissue of the other arm, without the veins being affected, and which, I think, was not mentioned before,—on account of its trifling existence requiring no local treatment, I am inclined to think this a genuine case of pimelitis or diffuse inflammation of the adipose tissue, and that the phlebitis was not the cause but the effect of pimelitis. This effect on the veins could not be discovered at an early period of the treatment, on account of enormous tumefaction of their coverings, which was extended almost as far as the axilla. Every one who has paid any attention to medical literature must be aware that a similar direction takes place from trifling injuries of the skin, and if death takes place, a similar effect will be discovered in the veins, clearly showing that, if pimelitis is severe and extensive, the veins are likely to suffer from inflammation. The object in all cases would be to support the powers by suitable nutriment, and to follow up every intention to prevent suppuration. Mercury here was given as rapidly as possible with that view, and the results would appear to justify the practice. Bleeding, either general or local, must, unless in very rare examples, be hurtful. Opium was a useful adjuvant, and the other diaphoretic and purgative remedies appeared useful in alleviating inordinate symptoms.

Hexham, March 19th 1842.

ART. VIII.—*On the Prevention and Management of Child-Bed Fever or Weed.*[*] By WILLIAM KERR, Surgeon, Corresponding Member of the Medical and Physical Society of Calcutta.

PROBABLY there is no disease which may in more instances be said to arise from ill-directed zeal for a patient's welfare than child-bed fever or weed, the following being by no means an unfrequent example of the manner in which a patient becomes ill, and is treated both by her unprofessional and professional attendants. A woman, some time after delivery, probably two or three days, or even a week, during a sleep perspires, and awakes chilly; she then pulls the bed-clothes more closely around her, and puts on another blanket to warm herself. For a short time, the uncomfortable sensations of cold are removed, but the perspiration continuing, they soon return with augmented severity. The patient is now sure that she has caught cold, and immediately adopts the necessary measures for removing it. Acting on this principle, she takes copious warm drinks to sweat it out, gets hot bottles to her feet, and a good fire in her apartment. Notwithstanding these vigorous measures for warming herself and expelling the cold, she soon feels that she cannot put her arms for the shortest period from beneath the bed-clothes without shivering; and if the same management be perseveringly pursued, in two or three days incoherence sometimes comes on,—always an omen of great danger,—and if the proper remedial measures be not adopted, the forerunner of death.

The whole of the treatment now described is founded on the supposition that the woman is cold, and is suffering from cold. Attentive observation, however, will lead to a very different conclusion. Almost as soon as a medical man has an opportunity of making an examination, the pulse will be found to be frequent, and will rise to 120 or upwards, as the disease, or rather as the improper management proceeds; likewise, if the temperature of the patient's skin be examined beneath the bed-clothes, it will be found to be considerably greater than natural, and during the prosecution of the supposed remedial measures, the patient, instead of finding that she is becoming more comfortable and returning to health, is getting rapidly more oppressed. The truth is, that the woman was too warm at the beginning, and has now, by erroneous treatment, been brought into a high fever. When she first awoke, perspiring and shivering, she was for the time overheated, and the shivering was merely the consequence of the dampness on the skin; a consequence which follows the cause more readily after delivery, than perhaps in any other state of body; the application of additional warmth temporarily removed the sensation of cold, but it produced more perspiration, and this again on the slightest exposure produced more shivering.* Death from weed is not exceedingly rare, but is generally attributed "to the occurrence of a febrile disease resembling, though scarcely agreeing with typhous fever, a very unexpected and perplexing malady which was treated in the most prompt and energetic manner, and yet baffled every thing which could be devised."

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[*] Called also Ephemeral Fever, that is, the fever of a day, an inaccurate appellation, this disease being of uncertain duration. I use the name Weed, for want of a better, to indicate that the disease under consideration is not the epidemic puerperal fever. In this essay, the term Child-Bed Fever is restricted to what is popularly called Weed.

The plan of treatment which, for ten or twelve years, I have successfully pursued is altogether the reverse of the preceding. After the birth of the child, and before leaving my patient, I instruct her to be very attentive to avoid getting overheated, and particularly to avoid perspiring. In the event of becoming rather warm and sweating, she is told to lessen the number of blankets, even though she should reduce these to a single one; and should any chilness be felt from evaporation of perspiration, she is instructed to take a quarter or half a wine glassful of any spirituous liquor, such as brandy or whisky, either undiluted, or, if the patient cannot endure the pungency of the undiluted spirit, mixed with a very small quantity of cold water. Whenever chilness from sweating returns, the brandy or whisky is to be repeated. The effect of the liquor is to remove the sensations of cold and the tendency to perspire. In present circumstances, cold spirits act very differently from warm toddy, the former drying up perspiration, and the latter increasing it. I have generally given brandy or whisky in preference to wine, from a belief that the former are generally lighter on the stomach. The apartment, which ought not to be small, is at the same time to be kept properly ventilated and cool, the bed being so placed as not to be in a current of air. In winter a small fire will generally be necessary to prevent the air from being uncomfortably cold. If a disposition to feverishness exist, all other drinks, as well as spirits, must be cool, at least not warm. These directions ought to be well explained, and the patient's attendants made to comprehend them before the practitioner leaves the house, because they are at variance with the plan which the patient and her friends will most probably adopt, if left to themselves, and if understood they will generally prevent the occurrence of child-bed fever. Too much care cannot be exercised to avoid this complaint; for when it does come on, even to a slight degree, such is the inability of the body in the puerperal state to resist injury, that the recovery will frequently be prolonged a week or two, or even longer. In pointing out the necessity of taking off bed-clothes, and otherwise cooling the patient when she sweats, and of giving a small quantity of spirits when she shivers, it is necessary to caution her that chilness may proceed from the temperature of the body being too low, which is recognized by the skin being perfectly dry; in this state she will require some increase of bed-clothes, and perhaps a piece of flannel wrapped around the legs. By this management she never being overheated, nor suffering from cold, the recovery will generally go on without an untoward symptom, and much more freedom may be used in changing the body-clothes, and making the bed, than in cases where sweating is not strictly guarded against.

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* I have seen several instances of illness unconnected with the puerperal state protracted in delicate individuals by similar management.

Besides observing the foregoing rules, there are several circumstances requiring attention, which are apt to excite feverishness, and hence with an improper regimen to produce or aggravate child-bed fever. These are constipation, after-pains, improper food, sitting up prematurely, and attempts to suckle their children on the part of delicate mothers who have scarcely any milk. If during labour the bowels are opened by an enema, a practice which should always be followed when time permits, on account of the diminution of oppression which it produces, even when the patient is unconscious of any sickness, and likewise on account of the pains after a thorough evacuation of the bowels being more effective, we need not feel any anxiety to open them again, till twenty-four hours after delivery, when a gentle purgative may be given. This having operated, the danger of feverishness coming on is much diminished; but during the whole confinement, after the first twenty-four hours, care must be taken to procure one easy evacuation daily. Sometimes exposure to cold, while the bowels are constipated, gives rise to a febrile indisposition, ushered, as in other fevers, by shivering without sweating. Attacks of this kind may occur for at least the first fortnight after delivery, and indicate that the bowels are not sufficiently open. The remedy is a laxative, and the skin being dry, spirits are not necessary. After-pains will of course require for their relief liberal doses of opium, aided perhaps by brandy. During the first four or five days, the food should be entirely farinaceous; afterwards a little chicken-soup may be permitted. Although by the third or fourth day some women are able, without injury, to be out of bed the greatest part of the day, yet, as a general rule, much suffering will be avoided by causing the bed to be kept for a week, more especially when the patient is not robust, or has had a severe labour. A woman of a feeble constitution ought to abandon the desire to suckle her child; if she makes the attempt early, pain in the breast is excited, feverishness comes on, and the secretion of milk ceases. In such cases a farther inducement to employ a nurse is, that nothing so much insures the health and future strength of the child, as an abundant supply of nutritious milk, which can only be got from a robust woman.

In a great many instances child-bed fever arises merely from the patient perspiring soon after taking a drink rather warm, being too closely covered up with bed-clothes, or some other cause apparently trifling, the effect of which, if properly managed, would pass off without even causing an indisposition, but in the way already pointed out goes on to produce a dangerous, or even fatal disease. When the patient and her attendants distinctly understand the management of sweating and shivering, the patient herself will often avoid danger by putting off a blanket when she feels rather warm, and may not require any spirituous liquor during her confinement. If, however, the overheating has produced sweating, and that again chilness, she may require a small quantity, such as a quarter or half-glassful of brandy, and very possibly no more may be necessary during her recovery. If, however, sweating and chilness return they must be combated in the same way, a quarter or half-glassful of cold spirits being sufficient at any one time to remove chilness. As a general rule, robust and healthy women are least apt to perspire, and consequently least apt to shiver and require spirits; and delicate women, on the other hand, those who are most apt to be seized with weed. When sweating and shivering, notwithstanding all precautions, return frequently, as in delicate patients, I have met with cases in which a chopin or more of brandy was consumed before the woman had gained as much strength as completely to overcome the tendency to perspire. The febrile heat is not increased by spirits or wine judiciously given; exhaustion often to a very great degree has been produced by the previous sweating, and stimulants are required to restore the lost strength. As already mentioned, chilness and shivering may proceed from several causes. When they arise from sweating, by far the most common cause, they are to be removed by the use of spirits or wine; when they proceed from constipation their removal should be attempted by a laxative, and when from cold, the skin being dry, by the administration of more coverings or gentle warmth.

When the patient has unfortunately got into a high fever, has a frequent pulse, and is incoherent, great circumspection and attention are requisite on the part of the practitioner. If lying in a small or heated apartment, she must be brought into one which is large, cool, and well ventilated. The bed-clothes must be regulated so as to allow her to cool; the extremities, if necessary, sponged with cool water, while spirits must be given so as to dry up sweating and remove chilness. In such a case as that now supposed, the debility great, with sweating and shivering recurring readily and frequently, brandy or whisky required to be administered freely. In this precarious state the fever generally produces an uneasy sleepless state, very prejudicial to recovery, which cannot be allayed by spirits alone, and requires opium in doses of about one grain once or twice a day. A moderately open state of the bowels is beneficial and necessary. If neglected, the fever increases, the belly becomes tumid, and the use of spirits is apt to aggravate the symptoms. As soon, therefore, as the strength is a little restored by other means, the bowels should be opened, if required, by an enema; but great caution must be exercised in this particular, for I have oftener than once seen irretrievable sinking of strength and death produced by the administration of a purgative, which unfortunately operated too freely. The following is an instance of one of these melancholy cases.

I was requested to visit a woman who had been attended by a midwife, and who, soon after delivery, had got into the very critical circumstances to which I have just been alluding. By cooling her, drying up sweating, and adding strength by the administration of spirits, giving rest and sleep by small doses of opium, I had, in the course of little more than one day, reason to think that she was in less danger. The midwife at this time paid her a visit, and inquired if I had ordered a dose of castor oil; "he must have forgotten it," said she, and accordingly it was administered. The operation was pretty free, but not more than would have done no injury whatever in many other states of the body; it was too much, however, for the patient, who immediately began to sink rapidly, and died.

The danger of purging depends entirely on the degree of weakness. If the strength is little sunk there should be no time lost in opening the bowels; but if there is considerable exhaustion, some improvement should, if possible, be procured, even before giving an enema. The attendants of the patient should be instructed to give wine freely in the event of prostration of strength following evacuations from the bowels. Mr White of Manchester, who, about seventy years ago, wrote on "the Management of Lying in Women," speaking of miliary fever, a disease which is akin to weed, being produced by too much heat and sweating, says, "a few loose stools, in some cases spontaneous, in others produced by art, have sunk patients beyond recovery."

To Mr White, more than to any other author, we are indebted for pointing out the pernicious effects of the sweating plan of treatment to which, at one period, every woman was subjected during her confinement. This practice, which had received the sanction of centuries, was to put on plenty of bed-clothes, give warm drinks, draw the bed and window curtains close, so as to exclude the possibility of fresh air getting in; and, besides all this, to keep on a good fire.* Mr White showed that this mode of management was the great cause of most of the evils which succeeded delivery, and arrived at the conclusion that, to prevent these, the skin ought to be kept dry. This related, however, to the prevention. When child-bed fever or weed had unfortunately come on, which he attributed to the absorption of putrid matter, he apparently found himself compelled to overlook his former conclusions, and to recommend that, in the cold stage, the coldness should be removed by the application of warmth, and that the hot stage should be shortened by means calculated to produce a sweat; a practice which, with scarcely any alteration, is recommended by Dr Burns, and is the mode of management pursued in the present time. In what way Mr White, after having so clearly and forcibly pointed out the danger of too much warmth and of sweating in the puerperal state, could still leave so much of the old system unexploded as to direct a sweat for the cure of weed, seems to me to admit of only one explanation, viz. that he was ignorant of any other mode of relieving chilness and shivering, than the application of warmth. This error being committed, there is no guide to point out the course to be pursued, and no consistency in the practice. Warmth is applied on account of sensations of chilness at a time when the patient is actually too warm, the sweating which follows produces chilness again, and more warmth is applied, with the effect of renewing and increasing the evil. As already stated, I give small quantities of spirits with the best effect in drying up sweating, and relieving chilness, without any of the evils attending the application of warmth. Sweating being removed, the real state of the patient is quite apparent, and the practitioner, keeping steadily in view the reduction of the morbid heat of the body, will generally soon find his patient convalescent.

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* In the Pictorial History of England there is a vignette representing an English bed-room in the reign of Edward IV. It is evidently a lying in scene, and a specimen of the heating system; there is a blazing fire, and the patient is guarded

A dangerous illness yielding rapidly to any particular mode of treatment must always be considered one of the best proofs of its correctness; in this point of view I am disposed to regard the following. A lady was delivered of a child by a midwife in August 1833. Every thing went on well till the end of the second or third day, when, on awakening from sleep, she felt herself chilly. An additional blanket was put on, and in succession warm drinks, hot bottles, and a good fire increased the evil. About forty-eight hours after the illness was first felt, I was called. She was then incoherent, being impressed, for instance, with the idea that she was not in her own house. I immediately caused her to be removed to a room without a fire, greatly lessened the number of bed-clothes, prohibited hot bottles being laid beside her, or warm drinks given, and directed small quantities of cold spirits to be administered frequently, partly to dry up sweating, and partly to give strength. As soon as the skin became dry, it was quite

from cold by blankets, and something like a small blanket laid over the head, which the newly made mother is raising with her hand to address her attendants.

evident that she was much too warm, and, the season being mild, the temperature of her body was reduced by bathing the hands and feet in cold water. Finding that she was still too restless to give any reason to believe that she would without farther aid obtain sleep, small doses of opium were administered, which produced the desired effect. In three days she was so much better that I did not consider it necessary to visit her oftener than once a day, and in four weeks I entirely discontinued my attendance. When her recovery was far advanced, her husband told me that the directions to cool her, which I gave when first called, were so contrary to all his conceptions of the nature of her malady, and to her own sensations of chilness, that he could not acquiesce in their propriety, till he saw that the progress of the illness was checked, and that recovery was taking place.

The next case is an instance of recovery from an illness in which dangerous symptoms were prevented or did not occur. It, however, affords an example, as I think, of the correctness of the treatment I have recommended, and it likewise shows that delicate females are more prone than robust to be seized with weed.

A lady whose constitution was very far from being vigorous, after an easy labour, was delivered of her first child. On the afternoon of the second day she became somewhat too warm, perspired, and was chilly. The error was only of very short continuance, for the patient was a near relation of my own, and I was never longer absent than two or three hours. On my arrival I cooled her of course; but little required to be done in this way; for she and her attendants had previously been put upon their guard, the apartment was large and well ventilated, and the weather was cool. The disposition to sweat, however, was considerable, and had I yielded to what may be termed the natural opinions of women in these circumstances, and endeavoured to remove chilness by the application of warmth, I would soon have converted a slight and incipient fever into a most dangerous, perhaps a fatal one. Watching, I may say, the effect of every dose, I gave small quantities of brandy, and had the satisfaction of finding that they produced the desired effect. Perspiration, however, frequently threatened to return, but was always prevented or removed by the same remedy, the pulse all the while becoming slower, and the sensations of the patient approaching more and more nearly to those of health. Such was the debility and tendency to sweat, that the use of brandy could not be altogether discontinued for a fortnight, and in that time she had taken more than a chopin of spirits. The child was suckled by a wet nurse, my patient having neither milk nor strength to undertake the office.

The good effect of brandy was here the more remarkable, on account of this lady when in her usual health, both previously and after her recovery, being unable to take the most trifling quantity of liquor of any description, on account of headach being excited, and yet, during her confinement, brandy produced no unpleasant symptom whatever. I may also mention, that, a few hours after shivering commenced, she had pretty severe pain in the right side of the abdomen, which yielded to the warmth and steady pressure of an attendant's hand continued for an hour. In this case brandy was required chiefly on account of the constitutional want of vigour of the patient. In robust women who have become dangerously ill, it is mostly required on account of the fever of two, three, or more days duration, generally reducing their strength to a degree which could scarcely be credited by those who have not seen it.

In two cases which I witnessed about the end of eight days, when the symptoms of fever had yielded, and the pulse had fallen nearly to its natural standard, other unfavourable symptoms appeared; these were diarrhœa in the one, and cough and expectoration with a frequent pulse in the other. These sequelæ, I imagine, proceeded from cold caught during the chills attending the sweating period. In both patients the secondary disease was overcome, but not before the debility and confinement to bed had given rise to extensive sloughs on the back and haunches, which after great and protracted suffering proved fatal to both. These individuals belonged to the working class, and possibly the smallness of their apartments created, during the febrile stage, a difficulty in cooling them without at the same time exposing to cold. The first case occurred in summer, but the window being near the only spot where the bed could be placed, could not be opened without hazard. The other occurred in winter, when comfortable warmth could not be maintained in the apartment except by a fire, and this could not be kindled without overheating the patient. The hardness of their beds was probably the immediate cause of the sloughing. In both instances the patients were nursed by their relatives with the most unremitting care and kindness, which very possibly, under happier circumstances, would have saved life. Bitter, indeed, is the reflection, that very many of our working population, who are worthy of a far better fate, whose actions do honour to human nature, are, and have been for years, unable to procure those comforts which are necessary in sickness or even in health.

Systematic writers have described, in the puerperal state, several fevers, such as the ephemeral or weed, the miliary, the milk, and the intestinal, allotting to each a section comprising directions for its management, thereby introducing complexity where much clearer views both of the pathology and treatment might be entertained by regarding these fevers as one, excluding from this fever the epidemic puerperal fever and febrile attacks accompanying inflammation in any of the organs of the body. These exceptions have never come under my notice in the practice of my profession, so that I can say nothing respecting their similarity or dissimilarity to the subject of this paper.

In 1820, Dr Marshall Hall published "Cases of a Serious Morbid Affection chiefly occurring after Delivery." This affection seems, in very many of the instances, to have been weed modified by peculiarities in the treatment, which possibly, from shivering being considered by him the precursor of great heat of skin and frequency of pulse, is not founded on the same views as those which I have adopted. In these cases, however, the reader will find decisive proofs of the danger, and even of the fatal effects of incautious purging, and likewise of the same results from the use of the lancet, although severe pain in the head or abdomen were present. I do not know whether the symptoms of the real inflammatory affections are as yet very accurately determined; but the observations of Dr Hall are sufficient to cause every practitioner to weigh carefully the whole bearings of the case before he ventures to bleed. All the cases from which I have drawn the conclusions contained in this paper were either unaccompanied with pain, or in them pain was not a prominent or abiding symptom. I have met with only two, which, in addition to the ordinary characters of weed, had symptoms which seemed to denote inflammation. The first occurred in consultation several years ago, when my opinions were less matured and decided, and when I had not seen Dr Marshall Hall's book. Not having notes of it, I merely give a short outline from memory. The patient, who, previously to delivery, was a strong young woman, was seized with pretty severe pain in the abdomen, for which she was twice bled. The result was unfortunate, death occurring suddenly as in some of Dr Hall's cases. The result of the second, which was managed without blood-letting, was very different. But, as much harm has been done to medicine by drawing conclusions from limited experience, I shall transcribe it from my notes without venturing to say that it establishes any line of practice.

Mrs W——, a healthy, but not a robust woman, aged 40, on the 31st March 1842, strained her left side by carrying a heavy basket for a short distance, and next afternoon was seized with pain in the same side of the chest attended with a cough, and aggravated by coughing, and even by inspiration. Next morning the pain became severe. In the evening she was seized with labour pains, and delivered of a child, (her ninth,) apparently six or seven weeks from the full time. After delivery, the pain continued unabated; and till I saw her, on the night of the 6th April, she was compelled by pain to remain several hours every day in a sitting posture in bed.

When I first saw her, she was lying on a bed in a recess, her skin warm and moist with perspiration; the pulse was 148; and the tongue whitish. She said, that, since the birth of the child, she had been alternately too warm or too cold. Her principal complaint, however, was of pain in the lower part of the left side, which was much aggravated by coughing, full inspiration, and motion, but gentle inspiration could be performed without much pain. The expectoration was colourless, though I was told that, a few days previously, some of it had been observed of a reddish tinge, as if some red paint, rather than blood, had been mixed with it.

I advised her to be removed to a bed in a more airy situation, to throw off bed-clothes till she should succeed in cooling herself, to take a glass of undiluted wine at any time when she felt chilly, and I gave her thirty drops of the solution of the muriate of morphia, (five grains of the muriate to one ounce of water,) with instructions to repeat the dose in three hours, if the pain and cough should continue.

7th, She has no perspiration, and is less warm, and in this respect, feels considerably more comfortable. Two doses of muriate of morphia have been taken; the cough and pain are somewhat lessened, but she is still forced to sit up a good deal, and has not enjoyed much sleep; pulse 140; tongue whitish. She has had one pretty free motion of the bowels. I have directed the muriate of morphia to be continued.

8th, This forenoon there was little change of symptoms; pulse 136; the pain perhaps a little worse. I ordered the wine to be discontinued. Of this she has taken about four ounces, which the attendants admit was given rather because she complained of weakness, than on account of chilness. I have ordered a sinapism to be applied to the side.

In the evening I called, and found that she had slept for some time after the application of the sinapism, but had awakened, complaining of pain in the side, which seemed to me to be worse than in the morning, though certainly better than at my first visit. Since yesterday forenoon she has taken three doses of the muriate of morphia; the last of these, fourteen hours before the present visit.

She complains that, owing, as she supposes, to this medicine, when about to sleep, or at least to close her eyes, she started up, thinking that she beholds some object which she finds to be unreal, and that this starting aggravates the pain. I suspected, chiefly from the disagreeable effects now produced by muriate of morphia, that she required a laxative, and have ordered a quarter of an ounce of castor oil to be given immediately, and, if it should not operate in six hours, this dose is then to be repeated.

9th, Last night she departed from my instructions so far as to take half-an-ounce of castor oil at once, and shortly after fell asleep; at two o'clock she awoke, and felt herself easier; at five she had a loose stool, and found that the pain was very nearly gone; before I saw her at mid-day she had other eight stools, and felt very much exhausted; her skin was moist with perspiration, which, since the night of the sixth, had been absent. The pulse, however, is only 100, and she has no pain, except on taking a deep inspiration. The cough is greatly diminished. After the purging commenced, she became so weak, that her husband, apprehending that she was about to sink, gave her a glassful of wine, and he had repeated that dose no less than five times before my visit. I ordered the wine to be continued at the rate of one glassful every three hours, partly to revive strength, and partly to remove chilness from perspiration. I likewise ordered an enema containing thirty-six drops of the solution of the muriate of morphia to be given immediately.

10 P. M. Since mid-day she had only two small stools; had taken the prescribed quantity of wine, which she relishes; has no pain worth mentioning, and scarcely any cough; pulse 96. Her flannels, which were damp with this morning's perspiration, were changed in the forenoon; since that time her skin has been dry, and of the natural warmth. I have ordered the wine to be continued, and another enema with morphia to be immediately administered.

After this it is unnecessary to give daily reports, as the recovery was rapid and uninterrupted. One glassful of wine was continued every three hours till the 11th, when her pulse had come down to 80; it was then given every four hours, and in five or six days was entirely discontinued. Morphia was required every day, but in doses gradually diminished, for, by the 12th, her sleep had become pretty sound, and by the same period appetite had begun to return. Pain on taking a deep inspiration continued to be felt for several days after the 19th. The lochia made their appearance on the 10th. She had no milk, and no attempt was made to suckle.

In this case a very small quantity of wine, smaller than in most severe cases, unattended with pain, was taken on the 6th, to remove perspiration, and it may be doubted whether that small quantity was really necessary. The pain on the 8th and on the two preceding days had so much of the inflammatory character, that I would have bled her, had I not determined to try first every thing else which I thought necessary. A laxative was evidently an indispensable remedy immediately required. The sudden and great diminution of pain, and fall in the frequency of the pulse, which followed its operation, attest its efficacy; but the dose was rather strong, and the sinking might have been more dangerous, had not wine been promptly and liberally administered. The beneficial effects of wine at this period were acknowledged by herself and attendants; and I think that it will be safe to infer, from the quantity administered, that this stimulant was really required. Whether cases of child-bed fever with symptoms of an inflammatory character will generally yield to a laxative followed by opiates, and, if necessary, wine, remains to be determined by experience.

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PART II.

CRITICAL ANALYSIS.

Art. I.—*Hydropathy; or the Cold Water Cure, as practised by Vincent Priessnitz, at Gräefenberg, Silesia, Austria.* By R. T. Claridge, Esq., Author of Guide along the Danube to Turkey and Greece, and overland to India. Second Thousand. London, 1842, 8vo, pp. 318.

Of all countries for the friendly reception and enthusiastic application of new, apparently new, or paradoxical pieces of medical theory and practice, undoubtedly Germany is the most remarkable. Even theories which have been discarded in the countries in which they took their birth, and practices which have become obsolete in the soil in which they originated, are there received with open arms, are cherished and fostered with the most affectionate attention, and are at length presented in a more finished shape, and with a more vigorous character, to solicit the attention of physicians, and claim the regard of the philosopher. It was thus that the medical principles of John Brown found in the German Schools more kind and attentive patrons than they could ever obtain in England, or even in France; that Animal Magnetism, after it could no longer maintain its ground in France, can still number many believers in Germany; that it has there led to the use of the metallic magnet in the treatment of diseases; that homœopathy arose and still with many flourishes with vigour and confidence; and that the cod-liver-oil, which, after being much used, and then abandoned in this country, has recently been eulogised by many eminent and respectable practitioners, as a remedy for many distempers to which English physicians never thought of applying it.

The external application and the internal administration of cold water in different forms for the cure of various diseases, has been a practice in use among physicians from a very remote period; and, though it has occasionally fallen into partial desuetude, it has never been altogether neglected, but has at different times been received and recommended more or less forcibly, and with different degrees of importance, as a very efficacious remedy in various formidable distempers.

Hippocrates appears to have been in the habit of occasionally employing the affusion of cold water in the treatment of the ardent fevers of the Cyclades, in the cure of tetanus, and in alleviating the burning heat and pain of gout, and some forms of rheumatism. At a period much later Antonius Musa is recorded by Suetonius to have cured the Emperor Augustus of some severe disorder, accompanied with catarrhal symptoms, by the employment of cold applications and the cold douche;[*] and the treatment afterwards became general and popular, until it received a sudden and violent shock in the death of Marcellus, the son of Octavia, and nephew of the Emperor.

In the sixteenth century we find Michael Angelo Blondi, an eminent surgeon of Venice, who practised also at Naples and at Rome, recommending strongly the use of cold water, as the best application in the treatment of wounds of every kind, excepting those of the nerves, and contused wounds; and Fallopius urging its employment in the treatment of luxations.

By far the most energetic and enthusiastic advocate, however, for the sanative influence of cold water, is found in Herman Van der Heyden, Physician to the City of Ghent, who published, in the year 1643, a discourse on Cholera, Plague, Gout, and the tertian and quartan agues of the Flemish Polders, or sea-coast marshes, in which he explained at some length, and in no diffident tone, the virtues and efficacy of cold water. The application of this agent, he tells us, Joubert recommends as especially beneficial in the treatment of gun-shot wounds,—as a means of preventing fluxion, the congestion of the moderns, and consequently inflammation, and as a means of which may both mundify, cicatrize, and, in short, fulfil all indications at all periods of the wound.

Though he does not go quite so far as Joubert, he allows that it is a most efficacious application as a refrigerant, detergent, and exsiccant to many ulcers, especially those which are malignant, inveterate, and disposed to the formation of fistulæ. He recommends it also confidently in contused wounds of the calf of the leg and contused wounds of the knee, in which he maintains that, under its use, the inflammation is seen visibly to decline, the pain speedily to cease, the redness and the swelling, however great, to vanish; though in order to produce these results it is requisite to employ it immediately and without intermission, or rather to plunge the leg in cold water for half an hour or thereabouts, that is until the pain and inflammation cease; "and by this means, he adds, a patient may be entirely cured in twenty-four hours of an injury which would have taken as many days, or sometimes several weeks, besides contingent danger, especially in old age."

In gout, he says, experience has abundantly shown that nothing can be so beneficial to the gouty, where coldness of temperament, decrepit old age, or inveterate gout, do not contraindicate its use, as spring or well-water taken cold or fasting ordinarily; either for preserving against hereditary gout, or after one attack; or to shorten the duration of the disease, or allay its pain. He accordingly recommends that, in order to alleviate and mitigate the symptoms of this distemper, and to accomplish its permanent removal, nothing is more requisite than to apply cloths immersed in cold water to the affected parts, the affusion of cold water on the affected part, or the immersion of the part in cold water during the space occupied in repeating the Lord's prayer. Even immersion of the head in cold water from the middle of the occipital bone to the tip of the nose, for such a space he represents as being singularly beneficial in removing obstinate, severe, and inveterate pains of that region; and where this may not be practicable, as in the case of females, it is still most useful to apply to the head a towel immersed in cold water, and repeat it several times; and in this form the application should be continued about a quarter of an hour altogether, as he thinks it is not so much the moisture as the penetrating effect of the cold that is required. The same agent he represents to be most efficacious in violent and long-continued toothach, in ophthalmia, in excruciating pain, we presume rheumatic, of the shoulder and arm, and of the back and loins.

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[*] Suetonii, op. Octavius, 81

The external use of cold water, Van der Heyden recommends with equal confidence in the prophylactic and curative treatment of gout, along with blood-letting, however general and local, and total abstinence from the use of wine, the latter of which, he thinks, is not of itself sufficient to effect a cure. With the intention of curing the disease during the fit, he recommends, after blood-letting, that, when the disease continues for seven or eight days, the patient should take every morning a beer glass of water, and occasionally every evening, one hour or two before supper, the same quantity of the pure element, to allay more effectually the pains of the night and induce sleep.

He further recommends that the same method be continued every morning for two or three weeks in spring and autumn, or when gouty symptoms are wont to come on, and that the patient should drink at each time the quantity of a beer glass, observing at the same time a good regimen.

The use of this remedy, he represents amongst others, to have been most beneficial to the late Queen Mother of France, who died at Cologne, to which she had then recently come from Florence when she married Henry the Great (IV.) This lady had been ordered by the physicians of their Royal Highnesses for ordinary drink, wine much stronger than she had been accustomed to, on account of pain in the stomach. But as this pain was both obstinate and augmented in severity, the physicians, suspecting that it proceeded from some acrid humour and hot distemperature, rather than cold and indigestion, changed their opinion, and agreed that her Majesty should drink water only in place of wine. This advice she immediately adopted, got rid of the pain in the stomach immediately, and continued to drink water very fortunately without indigestion or any other inconvenience, using only one or two spoonfuls of wine to a draught.[*]

A considerable time after Van der Heyden had expounded and illustrated the virtues of cold water externally applied and internally administered, viz. in 1697, Sir John Floyer published his Inquiry into the Right Use and Abuses of the Hot, Cold, and Temperate Baths in England;—in which, among other subjects, he explained the medical virtues and therapeutic effects of cold bathing as used by ancient and modern physicians, recommended it strongly as a remedy in gout, rheumatism, paralytic and neuralgic disorders, and gave a particular description of the virtues and medicinal effects of Buxton Bath, as the most excellent, temperate, and safe cool bath in England.[†] The chief object of the author in this Inquiry is averred to be his desire to impress upon the age the necessity "of leaving off the imprudent use of hot baths, and to regain their ancient natural vigour, strength, and hardiness, by a frequent use of cold bathing." He is a determined foe to the use of hot liquors, warm clothing, warm apartments, hot baths, the use of brandy, spirits, strong wines, strong ale, smoking tobacco, early marriages and their natural consequences, and, in short, all the luxurious habits of modern times, and imputes to them the marks of impaired health and feeble constitutions, then believed to be so prevalent; and urges forcibly the beneficial effects of cold bathing as a means of counteracting all the diseases then prevalent, and restoring to his countrymen the energy, vigour, and robust health by which he conceives their forefathers were distinguished. He speaks also from the force of personal experience. "I do not," he says, "persuade my reader to change those errors of living without having first done so myself; for by leaving off strong liquors and all hot diet, teas, coffee, &c. and by water-drinking and bathing at Buxton, I have procured to myself better health and more hardiness than I have enjoyed for many years before."

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[*] Discovrs et advis svr les flvs de ventre Dovlovrevx, soit qu'il y ait du Sang ou point, svr le Trovsse-Gallant, dict Cholera Morbvs. La Peste, les Effects signalés et incroyables de l'Eau : La vraye generation, cause, preseruation et curation de la Goutte : les Fieures tierces et quartes, et leurs accidens suruenans, causés de l'infection des Poldres, et terres auoisinées de la mer. Composé par M. Herman Vander Heyden, Medecin Pensionaire de la Ville de Gand. A. Gand, Chez Servaes Manilivs, Au Pigeon blanc, MDCXLIII.

Of this work a Latin translation with several additions was published at Leyden in 1752. Discursus quinque Magistri Hermanni Van Der Heyden, &c. 12mo.

[†] An Inquiry into the Right Use and Abuses of the Hot, Cold, and Temperate Baths in England, &c. By Sir John Floyer, M. D. London, 1697.

The work of Van der Heyden does not appear to have made much impression either on the physicians or the patients of the British Isles; and if that of Sir John Floyer did, the effect was temporary, evanescent, and limited; for the practice does not appear to have received any general attention, or to have supplanted the usual and more agreeable methods of relieving pain and re-establishing health. The hot regimen in acute diseases was then, notwithstanding the efforts of Sydenham, in almost universal use; and it seemed a revolution too great even in chronic diseases to proceed at once to the use of cold water in the form either of bathing, affusion, or application; and as to internal use, that seemed entirely absurd and fitted only for the lower animals. It seemed impossible to understand for what use ale, wine, and other strong liquors were discovered unless they were to be drank; and hence no one could be persuaded to drink pure water who could get any of the other liquors to drink.

At this emergency, a new advocate for the employment of cold water, both externally and internally, appeared in the person of Dr John Hancocke, not a physician, but a clergyman, rector of St Margaret's Church, Lothbury, and Prebendary of Canterbury, who published in 1722 his *Febrifugum Magnum*; or Common Water the best cure for Fever, and probably for the Plague, a work which, in a short time, went to the third edition. In this performance, Dr Hancocke recommends chiefly the internal use of cold water as drink for the cure of fevers, agues, pneumonic attacks, measles, asthma, hæmoptysis, colic, cholera, and various disorders of the digestive organs, stone, rheumatism, and gout. He does not appear to have had much experience of the effects of its external application; but he gives an abstract of that of Van der Heyden upon the same subject. It seems singular that the lessons and precepts delivered in this inquiry, supported as they are both by reason and experience, were not more generally adopted; for, had they been received and applied in practice, there can be no doubt that the heating regimen in general use at the commencement and during most of the course of the last century, would have much sooner been exploded and discarded, and that methods of treatment more natural, more agreeable to the feelings of the patient, and much less injurious, would have sooner come into general use. For a long time, however, the influence of the writers now mentioned appears to have been null and void. Cyrillo published in 1731 the results of his experience of the use of cold water in the treatment of Fevers and Febrile Disorders in Italy.* N. E. Dauter, at a period long subsequent, viz. in 1780, published a good dissertation on the external local use of cold water.† In the beginning of the present century, Dr Currie published, 1804, his Medical Reports, relating chiefly to the use of the cold affusion in the treatment of fevers and several other diseases.* Dr Stock published, 1805, his Collections illustrating the Physiological Action and the Therapeutic effects of Cold;† and Dr Jackson gave the result of his experience in the use of the cold affusion and cold drink in Fevers.‡

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* Philosoph. Transact. Vol. xxxvi.

† N. E. Dauter de Usu Aquæ Frigidæ externo topico. 4to. Gottingæ, 1780.

The contents of these works it is unnecessary here to recal. They are mentioned in order to show that the subject of the therapeutic influence of cold water in various shapes has not been neglected by the profession, but has, at different periods, been very fully and carefully studied, observed, and extensively applied. To these works might be added the Treatise of Beaupré, which was very ably brought before the public by our learned and indefatigable friend, Dr Clendinning.

The external application of cold as an antiphlogistic remedy in the treatment of various local diseases with inflammation, ulceration, and various other effects of inflammation, was still more amply and elaborately considered in 1838 by Dr Macartney of Dublin, who showed the extraordinary efficacy of this agent when applied with suitable attention and precaution, in abating the violence of inflammation, in promoting the cure of wounds, and in healing bad ulcers. To this subject it is unnecessary here to recur, as it was considered at sufficient length in our account of the treatise of Dr Macartney.

From this short review of the history of the medical and surgical use of cold water, it appears that it can by no means be regarded as a new or unknown practice; that it has been at different times very strongly recommended by different authors from well-founded confidence in its therapeutic powers; and that, if it have not been used in the treatment of all distempers, this arose from the circumstance, that, in various diseases, contraindications to its use arose, and rendered it necessary either to circumscribe or to modify its employment, external and internal, in the treatment of the distempers to which its employment was otherwise suited.

Notwithstanding, however, what has been now said, the practice described in the present volume has been brought under the notice of the public with a degree of pomp and circumstance that is due only to a practice entirely new and hitherto unknown. That practice cannot be with any justice denominated new; for if it has never in detail been carried so far as it has been by the hero, he may be called, of the present performance, the principle of the practice has been known, recognized, and admitted; and the practice has been adopted where it was conceived admissible, and not strongly contraindicated. We shall attempt to give a short history of the rise, progress, and present state of that method of treatment which has been emphatically called the Water Cure, and which has been represented to accomplish so many miracles. In so doing we do not mean to take much notice either of the preliminary matter by which Mr Claridge, the gentleman usher of Vincent Priessnitz has thought proper to introduce his history, or of the pathological speculations about the "peccant humours" and "superfluous juices" which are made to perform an important figure in his theory. We have no manner of doubt that Mr Claridge is an excellent and benevolent gentleman; but we think he will forgive us though we do not regard him as either a physiolo gist or a pathologist.

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* On the Effects of Water in Fevers, Liverpool, 1797, 8vo.; and Medical Reports, by James Currie, M. D. 2 vols. 8vo, Liverpool, 1804.

† Medical Collections on the Effects of Cold, as a remedy in certain Diseases, &c. by John Edmunds Stock, M. D. London, 1804, 8vo.

‡ On Cold Affusion, Cold Drink, and Gestation in Fevers, by Robert Jackson, M. D. Edin. 1808, 8vo.

Vincent Priessnitz, the modern author of the hydropathic, hydrotherapeutic, or cold-water treatment, is the son of the proprietor of a small farm at Gräefenberg, which was originally a portion of the neighbouring small town of Freiwaldau in Silesia. He received such an education as suited the son of a Silesian farmer, and was destined to the same useful occupation. Of his early life and conversation nothing is stated, save that, while engaged in haymaking, he was knocked down by a kick in the face from a horse, and the cart passing over his body, broke two of his ribs. A surgeon from Freiwaldau declared that he never could be cured in such a manner as to be again fit for work. The young man himself, unwilling to believe the accuracy of this prognostication, and having heard something of the treatment of wounds and injuries by means of cold water, endeavoured to accomplish his own cure on the same principles. To replace the fractured ribs, we are told he leaned with the belly with all his force against a table or a chair, and held in his breath, so as to swell or distend the chest. The ribs, we are further told, were thus restored to their situation. He then applied wet cloths over the affected parts, (that is, we suppose, both the ribs and the face; for of the treatment of the latter no detail is given); drank water plentifully, ate sparingly, and observed perfect repose. In ten days he was able to go out; and at the end of one year, he was again at his occupation in the fields.

No information is in this story given on the exact nature or extent of the injuries reputed to be thus speedily and simply cured. A kick on the face from a horse might have been supposed not only to have inflicted a severe contused wound, but to have fractured some of the bones of the face. Such an injury is usually followed not only by inflammation, suppuration, and occasionally sloughing, but even by symptoms of concussion of the brain, and consequent meningeal inflammation. Yet of these probable results no mention is made. Are we to imagine that this was a severe or a slight injury? To enable us to judge of its severity, and compare the effects of treatment with those of that usually pursued, more ample details ought to have been given, and the parts injured ought to have been described in an accurate and intelligible manner.

Again, of the injury of the chest no satisfactory or precise details are given. It is merely said that two ribs were fractured by the transit of the cart over the body of the young agriculturist. The fracture of two ribs is very rarely a severe injury; and unless the fracture has taken place in two points of the same ribs, or there is much displacement and laceration of the internal parts, and consequent hemorrhage and inflammation, union is commonly affected in the space of three or four weeks. There appears, therefore, nothing very wonderful in the recovery made by Vincent Priessnitz from the fracture of the ribs; and what were the circumstances of the injury which made the surgeon of Freiwaldau declare that he never could be cured so as to be fit for work again, we are left to discover altogether by conjecture.

Cured, however, Vincent Priessnitz was; and the cure or recovery was considered as so extraordinary and unexpected, that its fame was speedily spread among his neighbours, who then considered him a sort of doctor, and sought his advice first for their own complaints and occasionally, we are told, for those of their cattle. Probably in Silesia the human animal is less valuable than the brute; and the worthy Silesians imagined that after Priessnitz had tried his hand and established his character upon their own frames and constitutions, he was quite entitled to be exalted to the important charge of looking after the health and curing the diseases of horses and oxen. The great remedy of all this success was water, pure but plain spring water, taken internally in copious libations, and applied externally in every form that human ingenuity could devise. "Having no remedy but plain spring water," says his Coryphaeus, Mr Claridge, "no theories to puzzle his brain, and no guide but nature, which spoke to him the more clearly, because there was no art to stifle its voice, he soon perceived the defect of the present system of diet and mode of treating diseases, and found out, by the various applications of water, means of remedying most of those bodily evils which mar our happiness in life."

Priessnitz was thus a most fortunate man, and he had accomplished a task which all the physicians in the world, in all countries and in all ages, from Hippocrates and Aretaeus to Baillie and Chambers, had failed to achieve. It appears, however, that happiness is never complete on his earth. Freiwaldau, though described as a primitive town, embosomed in the hills of Silesia, and the inhabitants of which are mostly occupied in the patriarchal pursuits of agriculture or weaving linen, is not the abode of all the virtues. No sooner did the celebrity of Priessnitz, as a wonder-working medical practitioner, extend beyond the limits of his paternal acres, than the Freiwalders were seized with the feelings of envy; and they forthwith thought on the means of gratifying these amiable qualities by persecuting, we are assured, the object of them. Some sagacious persons thought that cures so marvellous could not be effected without the aid of one or more evil spirits, as they called them; and this would, if the authorities had been as blind, and bigoted, and superstitious as themselves, have consigned him to the tender mercies of the church and the law, to be dealt with accordingly. Others, who took a more earthly and carnal view of the matter, foresaw in the success of Vincent Priessnitz, a great afflux of strangers to Freiwaldau, and consequent increased consumption of what Mr Claridge affectedly calls *comestibles*, or in plain English, beef, mutton, veal, and lamb, rein-deer tongues, pork, hams and sausages, fowls and turkeys, bread and butter,—for it seems Mr Priessnitz, among his other good qualities, does not starve his patients,—and a consequent rise in the price of all things eaten. To Silesians this was a most alarming prospect; and a small bit of persecution was accordingly attempted in the form of a complaint to the authorities at Vienna. This, however, was too vague and unsubstantial an accusation to receive any serious attention; and it was found necessary to invoke the aid of the doctors by raising the cry of quackery. These learned persons, however, appear to have acted with a little absurdity; for they at the same time alleged that the sponges employed in the treatment contained some medical property capable of producing the cures, and they accused the practitioner of charlatanism and imposture. That the sponges did contain some medical property was very likely, exactly as a wet cloth or cold water itself may contain a medical property; but on this Mr Claridge gives no information. He merely states in a very silly manner that the sponges were decomposed,—we presume that he means analyzed,—and the fallacy of the allegation proved before the tribunal.

Then came the charge of quackery, or rather of Priessnitz practising without any license; and a commission of inquiry was immediately sent to Graefenberg. This commission found that the agents employed by Priessnitz in the cure of the diseases treated by him were cold water, air, and exercise; and we are informed that "they had such evidence of its beneficial effects and the total absence of all danger, even in the most advanced stage of disease, that, on their report, the government allowed Mr Priessnitz to continue his praiseworthy operations." Thus was Vincent Priesstnitz converted into an authorized, if not a regular practitioner; and the opposition and persecution which were kindly intended to annihilate him, ended only in fixing his influence upon a more stable foundation, and building him up for ever as a medical authority.

Vincent Priessnitz appears to have commenced this method of treatment in 1829; and from that time to the present, 1842, not fewer than 7000 persons have been to Gräefenberg to request the benefit of his assistance, that is, in the space of thirteen years, 538 persons on an annual average.

The actual numbers of invalids treated every year since 1829, are exhibited by the following lists:

1829,	45
1830,	54
1831,	62
1832,	118
1833,	206
1834,	256
1835,	342
1836,	469
1837,	570
1838,	800
1839,	1400 upwards.
1840,	1576
1841,	1400
	7298

Gräefenberg itself, the residence of this person, is a colony of about twenty houses, situate about half-way up one of the mountains of the Sudetae range,* forming part of the small town of Freiwaldau in Silesia, which is distant 18 English miles from Neissé, 70 from Breslau, 100 from Dresden, 260 from Berlin, 160 from Prague, 63 from Olmutz, and 175 from Vienna. It is about 600 feet above the town of Freiwaldau.

From its elevated position, Gräefenberg is exposed to winds, and it is likely to be cold, though Mr Claridge gives it in this respect a negative character, by urging that excessive heat is never felt there. The rising grounds behind are covered with extensive woods, which serve to protect the village from the violence of the winds, and at the same time from the heat of the summer sun. In these woods are the springs and douches resorted to by patients, the former during the whole day, the latter generally before and after dinner.

The town of Freiwaldau contains about 3000 inhabitants, most of whom are engaged in agriculture or the manufacture of linen. As the accommodations at Graefenberg are not adapted to families, a large proportion of those who have to undergo the water-cure, as it is termed, resort to Freiwaldau, the upper stories of the houses of which are let as lodgings.

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* Mr Claridge calls these mountains the *Sudates*. There is no such name as this mentioned by any author. The mountains nearest are manifestly the Sudetae or Suditae (Σουδῆτα ὀρη or Σουδητα ὀρη) of Ptolemy, described by him as running east and west in the centre of Germany, about the 50th degree of north latitude, and bounded on the east by the Hercynian forest, the Hartz of the modern Germans. From their position and direction, and the fact, that in them the Elbe has its source, they seem to be the Riesen-Gebirge or Giant's Mountains.

The establishment at Gräefenberg is placed on a long slope, which extends from the valley to the top of the mountain. From this point the views are said to be magnificent; and in one direction the plains of Prussia are seen. The most elevated houses chiefly belong to Mr Priessnitz. The principal one, in which he resides himself, is a large irregular building, containing a dining-room fit for the accommodation of 500 or 600 persons, numerous bed-rooms for patients, and a large bath, supplied like the others from a cold spring. The other houses are built without attention to architectural order, and are also furnished with baths. At a little distance below are other cottages, called the Colony, most of which are provided with a bath, and two with *douches*, and the proprietors of which act as baddiener or bath-servants to the invalid occupants. The house belonging to Mr Priessnitz himself contains room and accommodations for 200 persons, and about 150 more may find accommodation in the immediate neighbourhood, so that Gräefenberg alone may accommodate between 300 and 400 persons, the majority of whom take their meals at the public tables. Between the months of March and November inclusive, the resort of invalids is continued and uninterrupted, and all the available accommodation is completely occupied during that period. In November many begin to retire; and during the months of December, January, and February, not more than 100 persons remain in the elevated and cold region of Graefenberg. Hence, in order to procure any good accommodation, it is requisite to go early in the season.

Nothing can be simpler than the accommodations of the establishment. A bedstead with a straw mattress, a chest of deal drawers, a table, two chairs, a wash-hand basin, a decanter and glass comprise the whole furniture of each apartment. Mr Priessnitz, indeed, considers the absence of comfort in the apartments as an advantage, as it induces the patients to be more out of doors, breathing fresh air. He recommends all to be out of doors, unless for the purposes of repose and when under actual treatment. Most persons, however, may resort to the public saloon, where various sources of amusement and occupation may be found.

At Freiwaldau the apartments, though not good, are more suited for families. There, however, the cure of disease does not proceed so well as at Gräefenberg. This is partly ascribed to the circumstance of the temperature of the water not being so low as at Gräefenberg, and partly to that of the invalids being less under the direct control and rules of the establishment there.

This method of treatment cannot be said to be founded on any system of pathological principles which admits of clear enumeration or distinct understanding. The only exposition of pathological theory which we find in the present work, and which Mr Claridge adduces as some of the chief theories of Mr Priessnitz, is given in a series of aphorisms at page 89, and which, though mere assertions, and not in all cases very intelligible assertions, we must here put down in justice both to the author and his hero. Here they are.

" I. Health is the natural state of the body.

" II. The causes of bodily disease, which do not proceed from external injury, are material, and consist of foreign matter introduced into the infected system.

" III. This foreign matter is divided into four parts :—

" 1. Bodily substances which ought to be carried off, but have not been evaporated in proper time.

" 2. Substances which, according to their nature, cannot be assimilated with the human body, and, notwithstanding, have got into the stomach, or the skin, or have penetrated into the interior.

" 3. Contagious ulcers.

" 4. Corruption of the elements, water and air ; epidemical disease.

" IV. Every acute disease is an attempt of the system to dispel diseased matter.

" V. Fever is not the disease itself, but the consequence of it ; it is an effect of an exertion greater than the power of the system.

" VI. The radical healing of acute diseases is only possible by separating the diseased matter by means of water, an agent which invariably effects its object, and that always in a manner perceptible to the senses."

" VII. By means of physic and bleeding acute diseases become chronic ; the system, medically treated, seldom attains a partial, but never a total ejection of diseased matter ; therefore, physicians never get a sensitive perception of the causes of disease.

" VIII. As sooner or later a body must yield to the effects of drugs, it is quite impossible that any one suffering from chronic disease, should die a natural death, unless he be healed by hydropathy.

" IX. Chronic disease cannot be permanently cured by drugs : Hydropathy alone will effect this, by changing the chronic evil to acute eruptions, which are cured in the same way in which first acute diseases are cured, viz., by the water treatment.

" X. Mankind, like other organic beings, ought to live according to nature's laws, without pain, and die a natural death, that is to say, without illness or suffering. But with us almost every body dies from the effects of poisonous drugs, intoxicating liquors, adulterated food, want of water, air, and exercise. To this rule there are but two exceptions. First, if the elements, air or water, or both, be deteriorated, the two principal requisites of health disappear, and epidemics are the inevitable consequence, to which men as well as animals are exposed. Secondly, men are exposed to contagious diseases, but, except from epidemics and contagious disease, no one who has grown up in a natural water regime can be attacked by illness, outer hurts or hereditary complaints excepted,) and of these two diseases he can be generally speedily cured, and after the cure will always retain his health.

"XI. To think of curing disease with the poison commonly called physic, must, to the reflective mind, appear paradoxical, because it is impossible to bring the physic to bear upon the dispersed and deeply hidden diseased matter; and even if this could be done, it is quite impossible, as every chemist knows, that the morbid matter and physic should mutually dissolve each other into nothing. The consequence of such treatment with physic is, that, to the old evil, a new stimulus is added, weak or strong, according to the dose and quality.—'What is inflammable stays in the blood, and afterwards affects the brain.'—ARBUTHNOT.

"XII. No effective cure, whether of men, animals, or plants, can be made from the ejection of the diseased matter by means of their own organic strength, unless aided by the dissolving elements, air and water.

"XIII. This is the treatment which nature bestows upon all her creatures, and it may be asserted without fear of contradiction, that without internal and external water diet, there can be no health for life. We must not look before us into the grey mysteries and doctrines of the future, for the true mode of curing disease, but far behind us, on the green plains of nature, and of the times which are past."—Pp. 89–91.

It would be very idle to examine the accuracy of these aphorisms, or consider the nature of the evidence on which they rest. Indeed, no evidence whatever of their truth is given; and any one in the least conversant with the history of medicine must perceive that they contain a mixture of truisms and absurdities, and, with a large amount of the old humoral pathology, blend several bold assertions and unproved statements. We regret to remark, indeed, that at times Mr Claridge, who seems really a very benevolent and enthusiastic admirer of Vincent Priessnitz, indulges in speaking what bears a close resemblance to nonsense. Thus in the sixth chapter, on the Crisis, as it is emphatically called, he makes the following curious illustration and comparison.

"The crisis is a period in the treatment when nature is about to resume her power over the disease, when the latter has been attacked, and is struggling to escape. It may be compared to a tiger which a man is tempting in its lair. For a short or long time, depending upon the caprice of the animal, it lies dormant, only occasionally giving signs of existence, when suddenly it rouses, and a violent struggle ensues. The man, however, proves the stronger of the two, and the animal retires worsted in the rencounter. (Does he?) In all future attacks, too, which are even less vigorous than the first, the tiger is defeated, until it finally quits its lair and flies from its human conqueror. Thus, at least, are old chronic diseases eradicated; in acute cases the first rencounter very often settles the affair. It is in a crisis that the giant mind, the wonderful genius of

Mr Priessnitz are made manifest. Such is the unbounded confidence of the patient in him, that every one ardently desires to pass through this ordeal, it being the sure road to health."—P. 92.

Now surely Mr Claridge is not serious when he means to say that any man is capable of struggling with a tiger and overcoming him in the manner now described. We never heard even of any instance of a man, except Mr Van Amburgh or Mr Carter struggling with tigers and coming off victorious; and in all cases, instead of its being a struggle, the tiger clutched his victim by the arm or trunk, carried him off in his teeth as a cat would a mouse, and either destroyed him entirely or was compelled to resign him only when mortally wounded by the ball of some lion-hearted and steady-handed friend. He would have acted more usefully had he described accurately the phenomena of the crisis, which, indeed, we nowhere find done, but which, we can understand, consists in an eruption of a rash, or boils or pustules, in some part of the body after some symptoms of fever for one or two nights.

Some more of his pathological principles are given under another head, and are in the following terms:

"Mr Priessnitz's first endeavour is to alleviate pain, so that the patients may avail themselves of air and exercise. How far this object is attained may be judged of, from the circumstance, that out of 500 or 600, the usual average number of patients under his charge, there are seldom a dozen persons in bed at one time. If their complaint be fever, he is so completely master of the case, that no one ever keeps his bed, and seldom his room for more than two or three days, excepting in cases of typhus, a malady which generally takes twelve or fourteen days to eradicate, but hardly ever longer. The same remark will apply to rheumatism. If the sufferer can only reach Gräefenberg, he may be sure of immediate relief, such as elsewhere would be called a cure, and which is repeated many times a year; but the cure can only be regarded then as just commenced, it being Mr P.'s object to eradicate the cause of malady from the system. What is understood by a cure at Gräefenberg, is a perfect cleansing of the body of all impurities, a radical cure of that which has been the source of disease. Cases of no very long standing succumb to the treatment sometimes in two or three months, others resist for one or two years. Supposing, for an example, a young man to be attacked by gout, let him apply to Priessnitz and he will be cured immediately; but another, who has inherited it from his family, and who has been a bon vivant himself for a number of years, cannot expect to be made a new man, but with the exercise of patience; yet he will have this satisfaction, that during the cure he will find himself, in other respects, in perfect health, never be confined to his room, and be able to take plenty of exercise. This observation is made from the reports of several persons who are now undergoing the cure; these all agree in the fact, that though, previous to going there, they had been bed-ridden for years, they have never known what it was to be confined to their room for a single day, or even hour, since their arrival. Patients at Gräefenberg, with hardly any exceptions, eat well and sleep well, until they have what is called a crisis, *i. e.* till the disease comes to a head. Then we behold water warring against drugs and their effects. The power of the former is so great, that nothing can resist it; and the latter must make their exit by some means or other; by diarrhœa, by urine, by boils or ulcers, or fever, &c. These to the invalid, at a distance, carry with them cause for fear; but at Gräefenberg, a crisis is hailed with the greatest joy as the harbinger of health. It is at this juncture that the genius of that extraordinary man, Priessnitz, shows itself. He is never seen to hesitate, nor does the patient ever want confidence in him, for Priessnitz was never known to fail; when once the crisis, which is his object, is obtained, he can determine the extent of the cure, and time needful for completing it. All persons are expected to drink plentifully of water, the quantity depends upon circumstances, some ten or twelve, (none less) whilst others extend it to twenty glasses a-day. An inexperienced person would think that eating, *ad libitum*, was injudicious; but Mr Priessnitz lays no restrictions on his patients in this respect. The consequence is, that the mountain air, the exercise, and the water, produce an appetite, the satisfying of which, under any other circumstances, would be highly conducive to indigestion; but Mr Priessnitz persists in saying that water will digest any thing, and that the evil of eating too much will correct itself as the patient gets stronger, and approaches to convalescence. Whatever may be the state of the patient's disease no surgical operations ever take place, nor are patients, under any circumstances, subjected to the loss of blood, to blistering, or indeed any of the expedients resorted to under the allopathic system. If costiveness, indigestion, or inactivity of the organs, be the cause of complaint, water speedily removes it; if fever, wet sheets, and frequent immersions in the bath, have the desired effect."—Pp. 64–66.

We must, however, proceed to the method of treatment pursued by Mr Priessnitz.

It appears that in the practice of Mr Priessnitz the modes of employing cold water and obtaining its therapeutic effects are at least three. 1. The first is the general application to the external surface either by bath or douche; 2. The second is the local apcation to particular parts, and the method by ablution; and, 3. the third consists in the internal use, as by drinking and injections.

1. In the first mode, or that by general application to the external surface, a preliminary process of sweating in blankets is employed. This we must give in the words and language of Mr Claridge, that no misrepresentation may take place.

" The invalid is enveloped naked, in a large coarse blanket, the legs extended, and the arms kept close to the body; the blanket is then wound round it as tight as possible, turning it well under at the feet; over this is placed, and well tucked in, a small feather bed, sometimes two, such as are usually employed in Germany, instead of a number of blankets; finally, a counterpane and a sheet are spread over all: thus hermetically enveloped, the patient exactly resembles a mummy; sometimes when perspiration is difficult, the head, with the exception of the face, is also covered; but this expedient is not resorted to in the case of persons who have a tendency of blood to the head; the irritation caused by the blanket, and the closeness and duration of the confinement, render this operation disagreeable, especially as I have already observed, until perspiration commences, which, in some cases, takes place in half-an hour, in others in an hour, or even only two hours. After this, the patient sweats according to the orders of Mr Priessnitz, for from half-an hour to two hours. Previous to this packing up the patient, a urinal is placed between his legs, and any diseased part is bandaged with a damp cloth. When accustomed to this operation, the patient will be able to sleep until awakened by his attendant; those who perspire with difficulty are requested to move their legs, rub the body with their hands, and make all the movement that their close confinement will admit of. This little movement accelerates perspiration, which is always more tardy in summer than in winter; but, it should be observed, that if perspiration can be easily promoted without any exertion whatever, it is much more desirable.

" As soon as perspiration commences, the windows are opened, and the patient, if he wishes it, is allowed to drink a glass of cold water every half-hour; this is not only found extremely refreshing, but aids the sweating.

" If, during the process of perspiration, the patient should experience any headach, he may bandage the head with a damp cloth, an expedient which almost invariably succeeds in attaining its object. The duration of the sweating depends much upon the nature of the disease, the individual, &c.; in deciding this, Mr Priessnitz shows his great skill; there are some who sweat every day, others every other day, or every second or third day only.

" One would imagine that so much and such constant sweating must have the effect of weakening patients and making them thin; but at Gräefenberg the contrary effect is observed, where there are many who, although they were subjected to the loss of several pounds a-day in perspiration for upwards of twelve months, have yet preserved their original weight and strength; in fact, the latter was much improved, as well as their personal appearance. To facilitate the drinking of water when in this state a small glass pipe is used, one end of which is put into the mouth and the other into the glass.

" When the patient has sweated long enough, which, in ordinary cases, is determined by the perspiration breaking out on the face, the attendant takes off the different coverings until he comes to the blanket in which the invalid is to proceed to the bath; but previous to so doing, he is furnished with a pair of straw shoes, and the attendant (baddiener) damps the face, and that part of the legs and feet about to be exposed to the air with a wet cloth. After the blanket is well arranged round the body, and drawn over the head, the patient proceeds to the bath, which is either in an adjoining room or down stairs; here he throws aside the upper part of the blanket, and washes the top of his head, his face, neck, and chest, and then enters the bath, where he remains from two to eight minutes, according to Mr Priessnitz's instructions, whose mode of practice is diametrically opposed to the theory which forbids a body heated and covered with perspiration to be exposed to cold. Notwithstanding this, the two theories are equally well founded. The doctors are right in guarding against the influence of cold, when the body is heated by movement, or stimulated by sudorifics, for in this case death might be the consequence of such imprudence. At Gräefenberg the organs of circulation and respiration receive no impulse, either from movement or from remedial measures; but, on the contrary, they are in a perfect state of repose; besides which, it is not with a dry cold, that is to say, with the cold air, that the skin is brought into contact, but it is the action of cold water upon the body, in a state of perspiration, which irritates the skin in a manner not to be expected from the air to which we are constantly exposed. This sort of irritation determines the reaction or the produce of heat, which is not developed from a dry cold. To what other cause can be attributed that fine red colour of the skin, which all persons who have forced to produce a reaction, exhibit after each bath?

"This redness, which succeeds the douche as well as the bath, is for the doctor, as well as the invalid, a perfect touchstone. It gives to the first the assurance of his patient having strength to contend with the disease, and to the other a well-founded hope of being cured; for from the activity of the skin after the bath, an idea is formed of the more speedy or more remote chance of success.

"The sweating which precedes the bath not only makes a powerful impression upon, and attracts the morbid humours to the skin, but it contributes again to engender a more intense heat in the system; this heat is of importance even in the bath, as it enables the body to support, for a long time, the effect of cold water, which assists the more the longer it is continued. It is to be observed, that the longer the exterior cold and the reaction are kept up, the more the morbid humours are pressed to the skin, but the surplus of the internal heat ought not to be exceeded, for fear of producing congelation. Spontaneous nocturnal perspirations, which are called at Gräefenberg weakening sweats, ought to be avoided; this is to be done by covering the body very lightly, and by washing it at night with cold water. It is sometimes necessary when the skin is attacked by atony, to envelope the invalid in a wet sheet, in order to give it a tone before he is covered up for sweating. It must here be observed, that sweating is not administered to one half of the patients who resort to Gräefenberg; all depends upon what Mr Priessnitz thinks of their strength. Many persons who have commenced the water cure in other establishments in Germany, have been very much injured in their health by the injudicious use of this process, an evil which, owing to the superior skill and extraordinary powers of discrimination of Mr Priessnitz, is never to be feared at Gräefenberg.—Pp. 97—101.

To the same head may be referred the entire or immersion bath and the half-bath, both of which are much used at Gräefenberg.

The entire public bath is about thirty feet in circumference, and sufficiently deep for a man of the ordinary height to plunge into up to the neck; the water is constantly renewed by supplies from springs in the mountains, the waters of which are conveyed through tubes into the bath, and escape by an opening for that purpose, so that all impurities may be carried away. The mode of administration is described in the following manner:

> " We have already shown that the immersion of the body covered with sweat, into cold water, is exempt from danger, provided the organs of perspiration are in a state of repose. The risk which is incurred of catching cold, if, on arriving at a river to bathe, we remain until the body is cold and dry, cannot possibly exist in this case; as we thereby abstract from the body the heat which it requires to produce reaction, and thus lose the good effect of bathing. Then if we walk fast, or a long distance to the bath, it is requisite to repose a little in order to tranquillize the lungs, after which we must undress quickly and plunge head foremost into the water; having first wetted the head and chest to prevent the blood mounting to those regions. This precaution is strongly enforced at Gräefenberg. During the bath the head ought to be immersed several times into the water.
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> " It is equally useful to keep in movement in the bath, and to rub with the hands any parts afflicted. The skin is thus stimulated, and the sensation of cold abated. People whose chests are affected must exercise moderation in the use of the bath, entering it only by degrees, and not staying in it too long. In general, the time for remaining in the bath is governed by the coldness of the water, and the vital heat of the bather; however, no general rule can be adopted with respect to this. At Gräefenberg, where the temperature of the water is from 43° to 50°, no one stays longer in the bath than from six to eight minutes, many only two or three. Priessnitz advises his patients to avoid the second sensation of cold, which is a sort of fever, by leaving the bath before it is felt; by this means the patient will avoid a too powerful reaction; provoked by a great subtraction of heat. This precaution is indispensable at the epoch of the cure, marked by fevers and irruptions. Then a reaction, produced by an immoderate use of the bath or douche, would compel the invalid to keep his bed for some days, without at all accelerating the cure. Persons who undertake to treat themselves by cold water, ought to observe the rules strictly, as they will have no one to give them advice in case of transgression; when medicine would do more harm than good. There is but one thing

which they can use or abuse with impunity, and that is drinking water.

"On leaving the bath, which is found more refreshing than any one can imagine who has not experienced its effects, you are covered with a sheet, over that a cloak is thrown, and thus you go to your room, where the whole body is dried and rubbed; then you must dress quickly, and walk to keep up the warmth. To effect this, by the heat of stoves or beds, would be acting in direct opposition to the treatment. A glass or two of water immediately after the bath, is agreeable, and should not be omitted whilst walking.

"When irritation is highly excited during the cure, baths should be suspended, as they would augment it. A general washing of the body, and sitz-baths, are then resorted to. Sweating is also replaced by the envelopment of the body in a damp sheet, the repeating of which operation, together with the sitz-bath, will cause the irritation to cease."—Pp. 115—117

The half-bath, which appears to be of the nature of the common slipper bath, and its mode of administration, are next described.

"The half-bath is about the size of those generally used in our houses, and is only employed in cases in which the whole bath would be too much for the strength of the invalid, who may require to be bathed for a longer time, in order to excite the morbid humours. It is, in effect, less active than the entire bath, and being attended with less danger, is frequently administered to new-comers, for about a week preparatory to the large bath; the temperature of the small or half-bath is never lower than sixty degrees.

"The water in these half-baths is only about three to six inches deep. When it is necessary that the invalid should have the advantage of an entire bath, water is poured upon him, or the attendant constantly wets the body and head with the water of the bath.

"When these small baths are used, in order to be less exciting, the upper part of the body is covered, and the bath is hermetically closed, so that the head only appears. This is in cases where it is necessary that the invalid should remain in them for an hour or two. We have known Priessnitz order this for five or six hours at a time, and repeat it several days successively, in order to provoke irritation and produce fever. Last year, a doctor afflicted with an atonic gout, was subjected to this treatment, and was completely cured. It is, indeed, a common thing at Gräefenberg to see invalids remain for hours thus enclosed in the small bath, and continue doing the same for days, until fever is produced; this brings the morbid matter to the skin in the form of abscesses, which sometimes discharge themselves in sufficient quantity for the matter to fill several glasses. When this crisis takes place, the baths are suspended during the discharge of these humours, by which the system is much benefited.

"The half-bath is frequently taken by the patient immediately after he has been confined in the wet sheet. It is accompanied by a general sprinkling of the body with cold water and rubbing.

Whilst still sweating, the patient should hasten to the bath, throw off the covering, previously wetting the head or chest, and the attendant should pour a pail-full of water upon the head, when the face and the body must be well rubbed. This last part of the process is often continued for ten or fifteen minutes together. When the patient quits the bath he dries himself, dresses, and proceeds to take exercise in the open air immediately; but persons who have not the means of consulting a doctor acquainted with Priessnitz's mode of treatment, are not advised to attempt this.

"In almost all cases of fever the patient is first wrapped up hermetically in a wet sheet, which is changed as soon as it becomes warm, and repeated until the fever has subsided; he is then placed in the bath and rubbed all over, by two persons, with the bare hand, until all the symptoms are abated. The patient then joins in the promenade, or at the public tables. If at night he again feels feverish, the same operation is performed and repeated until he is perfectly cured. Thus it will be seen that at Gräefenberg, even patients with fevers that would endanger life elsewhere, are not confined to their rooms, nor is their diet changed."—Pp. 117-119.

2. It cannot fail to be manifest that the treatment now described is not, according to the ideas usually entertained of the human frame, exactly suited for invalids or delicate persons. It must try the system severely; and to endure it without injury is proof of considerable vigour. Accordingly, the second method, or that by ablution, is intended for persons, we are told, extremely weak, and for children. It is thus described,

"In cases of extremely weak persons, washing all over is substituted for the bath or douche, and water is poured on the heads of those subject to feverish irritation, which descends and wets the whole body, whilst it is rubbed with the hands first all over, and then partially upon those parts affected.

"When the weakness of the invalid does not admit of this rubbing, a wet sheet is applied, not so well wrung out as usual, upon which it is easier to use the prescribed friction. This latter process is to be preferred to the bath, when any doubt exists as to the patient not being able to support the immersion in the water. It is particularly beneficial to children.

"We cannot recommend the ablutions too much, to persons who are desirous of treating themselves; they are recommended principally on rising in the morning, and at night, before going to bed. In trifling complaints, gout in its infancy, nervous irritability, or in weakness of the skin, these ablutions, accompanied by drinking abundantly of cold water, are very often sufficient to establish health. These ablutions should be performed in the morning, instead of the evening, immediately on getting out of bed, before the body has become chilled, and the patient must afterwards take exercise in the open air. In order to use the wet sheet as an ablution, the person affected stands up in the room, when the servant throws it over his head and body; the latter should be well rubbed for five minutes, and then the wet sheet should be succeeded by a dry one. Let any fatigued person try this, and they will at once perceive its great utility.

"These cold applications fulfil two objects diametrically opposed to one another, *i. e.* the first to calm, and the second to stimulate. The bandages which refresh, are used in cases of inflammation, congestions of the blood, headaches, &c.; to these are always added the sitting (sitz) baths. For this purpose, linen, after being wetted in cold water, is doubled several times, and then placed upon the parts affected, where they ought to remain until they begin to get hot; then they must be renewed until a cessation of the cause for which they are applied ensues.

"The sitz baths ought always to accompany these bandages, as they prevent the increase of heat to the head, and are most efficacious in allaying inflammations which attend fractures or other wounds.

"The stimulating bandages are highly important; they differ in some respects from the first. After being dipped in cold water, they should be well wrung out, and then so hermetically applied to the afflicted part, that the external air cannot penetrate. This is effected by another bandage, perfectly dry, being placed over the original bandage; by which means all the humidity is retained, or thrown upon the system. This produces heat, which cannot be procured by any other means. This humid heat has a stimulating and dissolving property, it provokes perspiration, which extracts a quantity of vitiated humours, as is demonstrated at Gräefenberg by the bandages and the water that they are washed in. Prince ——— who, twelve months previous to going there, had rubbed into his leg a light green ointment for about a fortnight, found that the whole of it came out of the flesh by means of these bandages. They are renewed when they get dry, excepting at night, when they are allowed to remain. These cold bandages are applied to various parts of the body, and are so important, that every person under the treatment is conversant with their use. They are applied in an infinity of ways. Those afflicted with complaints of the chest and throat, wear one round the neck and on the breast at night; those with weak or inflamed eyes, wear one at the back of the head and neck at night; those who have weak digestions, and are otherwise debilitated, wear one round the waist all day—whilst gouty and rheumatic subjects also have their feet and legs encased in them by night. The umschlag is invariably applied to all wounds, bruises, and generally diseased parts, as also to any part of the body where pain is felt. Its assuaging power is almost incredible. The bandage for the waist consists of a towel about three yards long, and one foot wide; two-thirds of which are wetted, and one-third left dry. The wet part is wound round the belly, and the dry part covers it. Strings are attached to the dry end so that it may be tied. The property of this fomentation is to increase the heat of the stomach, and to assist digestion; from which results the formation of better juices; it cures intestine congestion, constipation, relaxation, and appeases the colic and griping pains."—Pp. 102–105.

There is scarcely a dreadful or incurable disease which is not represented to be benefited by this mode of applying cold water; and among the list are, gout, rheumatism, enlargement of the bones, arthritic concretions, that is, gout-stones, abscesses with or without ulcers, chronic inflammations, external injuries and their consequences, syphilitic ulcers, caries and cancer. We are further informed, in the true spirit of the humoral pathology, that, in the absence of pre-existing ulcers, the treatment seldom fails to produce abscesses, which serve as issues to the vitiated juices.

In conducting the treatment of fevers and various diseases of the skin, we suppose acute, the following is the method pursued:

> "One is not surprised at a little fear being manifested on learning, that these invalids are enveloped in a wet sheet; nothing is more true, however, than that this fomentation tranquillizes the patient, facilitates the eruptions, and provokes, in cases of fever, a most beneficial perspiration. To carry this process into execution a blanket is spread upon a bed, and upon that a wet sheet, the latter being previously well wrung out. In this the invalid is hermetically enveloped, with the exception of the face. The blanket is closely wound round the body, which is already encased in the sheet. Many other blankets should be added, well tucked in, so as to produce immediate heat. To check a fever the sheet should be changed every half-hour. At Gräefenberg, in desperate cases, we have known this done fifty times in twenty-four hours; when persevered in it never fails of success. When the fever is abated the patient reposes a little in the last sheet to promote perspiration, then he is placed in the half-cold bath, not lukewarm, but still with the extreme chill taken off (about 64 degrees of Fahrenheit) for fifteen minutes, during the whole of which time he must be rubbed by two persons; the water ladled out of the bath being occasionally poured over the head and shoulders. When fever commences by cold shiverings, the bath is persevered in even for hours, until a general heat is infused into the body. Where there is a difficulty in obtaining a bath, a sheet perfectly wet, that is not wrung out, should be thrown over the patient, and that should be well rubbed against the body for five minutes. It is only on their first application that these sheets and bandages are disagreeable, as they become warm almost immediately."—Pp. 106–107.

The umschlag, or means of application, not bandage, as Mr Claridge calls it, consists of a piece of linen once or twice doubled, dipped in cold water, and well wrung out, and over this must be placed another piece of linen sufficiently large to conceal the former. These are worn together, sometimes on one, at other times on several members of the body at the same time, and generally at night, though where there is pain they may be worn by day.

Another local mode of application besides ablution and the umschlag, or wet cloth, consists in the local bath, or a bath applied to particular regions of the body. Such are the cold-water foot-bath, the head-bath, the finger-bath, the eye-bath, the leg-bath, the douche-bath, and the seat-bath.

The foot-bath appears to be applied in a great variety of modes, and, like all the other forms of the remedy, is used for the removal of several very different diseases.

"The foot-bath is employed almost exclusively as a counteracting agent against the pains of the upper part of the body. Priessnitz substitutes these baths for the same purposes that the faculty order warm ones. Headache, and toothache, whatever may be their causes, particularly those that are of a violent nature, inflammation of the eyes, and effluxes of blood to the head, are almost always relieved by the means of the foot-bath. To this is added the application of wet bandages. The tub, or basin, in which these baths are taken, ought only to contain water from two or three inches deep, or just enough to cover the toes; for the tooth-ache, one inch is sufficient; and the bath may be applied for from fifteen minutes to half-an-hour. In cases of sprains, the feet must be put in water up to the ancles. The water, when it becomes lukewarm, should be changed. The feet, during the whole time, should be well rubbed by the hand, or against each other, in order to promote a strong reaction. Care must be taken that the feet are warm before they are put into water, and exercise should be taken immediately afterwards, to bring back the heat to them. Rubbing them with a dry hand assists this very much. Cold foot-baths are sure means of preventing tendency to cold in the feet; the application of hot water only weakens the skin, and renders the feet more susceptible to cold. When they are extremely cold, instead of exposing them to the fire to warm, it is much better to produce the effect required by exercise. If we want any proof of the reaction caused by the foot-bath, and its powers of preservation from catching cold, we have but to feel our feet an hour or two hours after the bath, and we shall then find them extremely hot. If we cannot avoid being exposed for a long time to a piercing cold, it is well to take a cold foot-bath two hours previous to going out. After great fatigue, a foot-bath of this description, before going to bed, is most refreshing. Gouty subjects should not use these baths without advice; but to people in general, Mr Priessnitz recommends their frequent use. He contends, that in the feet many of the most serious complaints commence.

"Homer, when he stated Achilles to be invulnerable, except in the heel, no doubt knew that the feet were the most important parts of the human frame. The poorer people, who wear neither shoes nor stockings, or whose feet are constantly exposed to a sort of foot-bath, are seldom subject to those complaints which attack the upper regions of the body.

"An Irish gentleman, thinking to do his shepherd a service, who had lived in a low marshy situation for many years, sent him to another estate, which was high and dry, and asking him how he liked it, he replied, 'Not at all; he had never been well a day since he had been there, for there was not a drop of water to wet his feet."—Pp. 119—121.

The head-bath is applied in a manner not less curious, and for complaints not less different. Its effects, like those of the other baths, are stated to be inflammation of the subcutaneous cellular tissue and ultimate abscess.

" Head-baths are used for rheumatic pains in the head, common headaches, rheumatic inflammations of the eye, deafness, loss of smell and taste. They tend to disturb the morbid humours, which nature generally evacuates in the form of abscesses in the ears. They are also used to prevent the flow of blood to the head, but in this case only for a few minutes, in order to avoid too great a reaction. These should be followed by exercise in the open air, in the shade. This bath is used as follows: a washhand basin should be placed at the end of a rug upon the floor. On this rug the patient should extend himself, so that his head may reach the basin, at the bottom of which may be placed a towel for the head to rest upon. Then the back of the head must be placed in the water; then one side, and lastly, the other side of the head. All this is terminated by again placing the back part of the head in the water.

" The duration of this bath depends upon the nature and extent of the disease. In chronic inflammation of the eye, each part of the head should remain in water for fifteen minutes; and as long for deafness, loss of smell and taste. All this will occupy an hour, during which time the water should be renewed twice.

" If these baths are continued with perseverance, success is certain. This success is generally announced by violent headaches, until the formation of an abscess takes place, which finishes by breaking.

" The common headache, the back of the head may be exposed to the water from ten to fifteen minutes, and each side from five to ten minutes; if they are obstinate, a foot-bath and a sitz-bath, both slightly chilled, should be used for half-an hour each."—Pp. 121–122.

Then comes the finger-bath, which is employed for the cure of whitloe, followed, however, by the application of bandages; the eye-bath, which is used for the removal of ophthalmia and corroborating weak eyes; the leg-bath, which is used for the rheumatic pains of the legs, ringworm, ulcers or wounds of the legs; and lastly, the douche-bath and the seat-bath.

" The douche, of all the means employed, is the most powerful in moving the bad humours, and disturbing them from the position which they may have occupied for years: they are also used in the greater number of chronic diseases. The douche corrects the weakness which the skin may have contracted in the process of sweating, and also fortifies it. It hardens the body, and renders it capable of supporting all variations in the atmosphere. It exercises a powerful action upon the muscles and nervous system, by the reaction which it provokes. What is understood by a douche, at Gräefenberg, is a spring of water running out of the mountain, conveyed by pipes into small huts, where it falls from the top in a stream about the thickness of one's wrist, which fall constitutes the difference between the douche and a shower-bath: outside this hut is another for dressing, constructed like the first, in the rudest way imaginable.

"There are six douches in the forest of Gräefenberg, the fall of the first is fifteen feet; the second ten feet; the third twenty feet; the fourth eighteen feet. The douches set apart for women have a fall of twelve feet each; the diameter of the fall is the same as in those of the men.

"At the colony there is a douche which is available all the winter; this is not the case with the others. About half-a mile out of the town of Friewaldau, there are four more douches, resorted to by both sexes. Nearly all the douches are at some distance from the places of residence of the patients, which occasions a walk to arrive at them, so that the body is in a glow, and better calculated to be benefited by the effect of the water, when submitted to the process.

"Parts afflicted should, for the greater part of the time, be exposed to the action of the douche, though it must be received occasionally upon all parts of the body, except on the head and face, unless this is especially ordered by Priessnitz. Weak chests should also avoid it on that part and the abdomen, otherwise the fall of the water on the lower part of the stomach or belly is not injurious. The atony of this region will not, however, always resist these means. The relief afforded by the douche, sometimes in a few minutes, in arthritic cases and rheumatism, is almost miraculous.

"The douche being intended to put the morbid humours in movement, ought to be discontinued when it produces feverish excitement, and be commenced again when that has ceased.

"The duration of the douche is from three to fifteen minutes, and rarely extends beyond the latter. The time for douching is one hour after breakfast, and two hours after dinner. Most of the patients at Gräefenberg are very much pleased with this part of the treatment.

"For want of a better term we adhere to that of the Germans, and instead of a sitting, we call this a sitz-bath.

"This is a small flat tub, of about seventeen inches in diameter, with water seldom more than three or four inches deep; in this people sit, as in a hip-bath, with their feet resting on the ground, for different periods; a quarter of an hour, half an hour, an hour, or more, as may be deemed sufficient. This, in some cases, is repeated two or three times a-day. The sitting-bath is considered by Mr Priessnitz to be of so much importance in his treatment, that those patients are considered quite as exceptions, for whom it is not prescribed. It has the effect of strengthening the nerves, of drawing the humours from the head, chest, and abdomen, and relieving flatulency, and is of the utmost value to those who have led a sedentary life.

"The object of using so little water in this bath, the half-bath, and foot-bath, is, that a reaction may the sooner be effected. If a greater body of water were used, it would remain cold during the whole time of its application, and cause congestions to the upper regions; whereas, in this case, it almost immediately attains the heat of the blood, and admits of an immediate reaction.

"To prevent the former, the patient should apply a wet bandage to the head; and to succeed more effectually in the object for which the sitz-bath is prescribed, he should rub the abdomen as much as possible with a wet hand."—Pp. 123–126.

3. The third mode employed by the hydropathic physician to procure the therapeutic effects of cold water is by drinking it and using it as injections into the different cavities lined by mucous surfaces.

"Priessnitz only prescribes as much water as the stomach can support without inconvenience; less than twelve glasses a-day would not be sufficient, and from that number we may drink up to twenty or thirty. It will soon be easy for persons who proceed gradually to accustom themselves to the drinking of water. In the beginning of the cure, the want of thirst appears to be the great obstacle; but it is not long before the desire is felt for drinking. This is perfectly natural; for so great a quantity of juices cannot be lost by perspiration, without nature feeling the necessity of replacing them. A great deal of exercise, causing perspiration, also produces thirst. Most of the processes of the cure are stimulants, and produce greater heat, which heat becomes another source of thirst. Priessnitz attributes much of this thirst to the presence of bad juices in the frame. His opinion is founded on the remark, that thirst generally ceases after their evacuation. Some persons on first drinking water feel sick, or even are sick, or else have diarrhœa; these symptoms only prove that the stomach contains remains of diseases, which the water has disturbed. Instead of discontinuing it, it is requisite to drink more, the patient is then certain of getting rid of these inconveniences, as will be proved by the augmentation of appetite which soon follows.

"When the stomach is in pain, from being overcharged, Priessnitz prescribes the drinking of cold water until sickness or diarrhœa is the consequence; and the patient may continue in it till both symptoms have disappeared. This manner of proceeding is far preferable to the severe diet which is generally imposed when the stomach is overcharged. Priessnitz's method cleanses it of all impurities, which, with abstinence, pass into the blood. We know that vomiting also produces this effect; but this is a remedy that weakens the stomach. Water, on the other hand, has precisely the contrary effect.

"Cold water, as a beverage, is particularly useful; it fortifies the stomach and intestines, by clearing them of the bad juices they contain: it favours the generation of new juices; it mixes with the blood by absorption; it spreads itself quickly through all the organs;

it attenuates, purifies, and dissolves the sharp or thick humours, and discharges them by means of perspiration and urine. Considered as a means of diet for slight indispositions, bad digestions, and generally in all cases of disease for which the faculty recommend aperients of mineral waters, it cannot be too highly appreciated. On getting up in the morning, after a cold ablution, take a good deal of exercise, and whilst doing so, drink plentifully of water. It will have the same effect as a purgative or mineral waters, without, like the latter, weakening the digestive organs. All persons may drink cold water without the slightest risk or danger, and to those who, at a later period, intend proceeding to some hydropathetic establishment, the habit of doing so is strongly recommended, as it will facilitate their cure.

"All times of the day are favourable to the internal use of water. Priessnitz, with respect to this, has no other rule than allowing people to drink any quantity of water they like, so that they are not inconvenienced by it; except that he thinks water and exercise taken before breakfast produce the best effects. It is above all after sweating that drinking cold water produces an expectoration of the glaires. Water may be drank after breakfast, but not so as to overcharge the stomach. During dinner the aliments should be moistened by some glasses of water, then the stomach must be left to repose; some hours afterwards again water may be drank until supper time. Drinking after supper is no less useful; but it may break the rest by causing the invalid to rise often in the night. We must not forget that exercise, which is to a certain degree indispensable, stimulates the action of the water, and accelerates the cure. Water, to produce the desired effect, ought always to be drawn fresh from the spring, and as cold as possible. The decanters which contain it ought to have stoppers, as the water in them will then remain longer cold and fresh."—Pp. 108—111.

We have no doubt that these copious libations of cold water form a most important part of the treatment, and contribute, with the fresh air and exercise, more powerfully and efficiently to the recovery of patients than all the other treatment put together. The internal use of cold water, as here practised, implies not only the exclusion and rejection of much that is detrimental, but the introduction into the system of an agent most beneficial in preserving health and efficient in restoring it. Its use excludes that of wine, spirits, liqueurs, malt liquors of every kind, and, indeed, all those artificial liquids which impair the action of the stomach and liver, which disorder and pervert the circulation, dispose to steatomatous deposition in the arteries, and, indeed, render the human frame so susceptible to the influence of morbific agents. Thus, by its diluent properties, it favours the normal fluidity of the blood, promotes the circulation, allays irritation in various organs, and facilitates all the secretions, and often checks the progress of disease in its origin.

The only difficulty is the immense quantity of cold water that is stated to be taken by the patients in a given time. According to Mr Claridge, less than twelve glasses daily would not be sufficient, and from that number up to twenty or thirty glasses may be taken. This must be equivalent to from ten to twenty English pints of water, which is assuredly much more than persons who live regularly and temperately can ever require to take. A considerable quantity, that is about two glasses or three, is recommended to be taken in the morning before breakfast, when it is represented to exercise its most beneficial effects. Then we are told it must be drank after breakfast, but so as not to overcharge the stomach. Then, during dinner, the food must be moistened by some glasses of water, after which the stomach must be left to repose it is said. But again, we are told, some hours after, water must be drank till the hour of supper; and after supper, though it is said to be no less useful, a caution is given to take it in moderation, as it may break the rest by causing the invalid to rise often during the night. The quantity of water taken in this manner must be much greater than is drank by the greater proportion of the human race in temperate climates. At the same time, the beneficial effects of the element cannot be denied.

The injections may be regarded as not less beneficial. Their application and effects are described in the following manner:

> "Under the denomination of injections, we understand principally clysters, which the patient applies himself. When he is not in the habit of using them with cold water, they must not be applied at first for longer than two minutes; but by degrees the intestines become accustomed to it, and they, the clysters, are often absorbed like a glass of water introduced into the stomach. A second injection is repeated immediately after the expulsion of the first. Cold injections are used for constipations and diarrhœa, two diseases diametrically opposite, but which arise from the same cause, the weakness of the intestines. Thus the contradiction is only in appearance, the great object of injections being to establish the tone of these organs, and regulate their functions; they ought to be aided by the use of cold water in other ways.
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> "There are also various injections in use at Gräefenberg. I allude to those applied to other cavities of the body, such as the ears, nostrils, and the genitals. Particular syringes are used for these purposes, and are directed against the mucous matter in those parts. The best means of preserving the teeth is to wash the mouth often, after eating in the morning, and particularly in the evening; snuffing up water into the nostrils is the best means of curing a cold in the head. Scrofula in the nostrils is a disease very common in children, this also is treated with success by means of the same practice."—Pp. 111-112.

Thus cold water applied to the human body in every possible form is the grand agent by which Priessnitz undertakes to cure, if not all, at least a very considerable number of maladies. He is not very anxious about any particular regimen, except that the food must not be seasoned with stimulating or pungent condiments. He allows his patients to eat freely of beef, mutton, veal, pork even, venison and game, poultry of all kinds, pastry, and vegetables of different kinds, though in smaller quantity; game is least common, and fish is rarely seen at the table of the Gräefenberg establishment. Bread, milk, and butter are the chief articles employed at breakfast and at supper; salt fish, salt meat, and cheese are prohibited upon the same principle on which condiments and highly seasoned food are condemned. In the same manner, all those excitants or stimulants which are in common use are altogether excluded; for instance, not only wines, spirits, and liquors, but even tea and coffee.

Priessnitz is also particular regarding clothing. The usual system of clothing thickly with flannel next the skin, he totally and unconditionally condemns. The first thing that he does, indeed, is to order his patients to throw aside flannel or cotton clothing next the skin, and wear only linen. When patients wish to retain the flannel shirt, he orders it to be worn outside the linen. Even covering the head during the night he disapproves of, as calculated to injure the hair, to cause its premature decay, and increase congestion towards the head. Exercise is also recommended as indispensable.

There seems to be no doubt that one of the effects of all this external application and internal imbibition of cold water is the production, after some time, either of an eruption or eruptions on the skin, as pustules or boils, or abscesses in the subcutaneous cellular tissue. This denotes, doubtless, an inflammatory state of the system, and seems to be partly the consequence of the plethoric state induced by the full diet which the patients are allowed to take when under the water-cure, and partly the effect of reaction excited by the constant or repeated application of cold water. It is not difficult to see, according to the usual principles of pathology, that if, while patients are subjected to the tonic effects of cold baths, cold drinks, and cold applications generally, means are not, at the same time, employed to diminish plethora, but the patients, on the contrary, are allowed to eat as much animal food as they choose, an inflammatory state of the system must be generated; and that this will give rise to some inflammatory or suppurative disorder. It is a manifest and undeniable advantage, that this inflammatory process does not usually, in the practice of Vincent Priessnitz, affect any of the internal organs; and if it be a peculiarity of the water-cure, that it affects only the skin and cellular membrane in the manner now specified, the advantage is great. This occurrence is denominated by Priessnitz the Crisis, as he seems to regard the cure as incomplete without its appearance. That it does take place in the course of the treatment is testified by Mr Claridge, Dr Bigel, (p. 159,) Dr Engel, (p. 166 and 167,) and Dr Gross. A nice distinction in the kind of crisis is drawn by Dr Engel of Vienna, according to whom the diseases caused by the irregularity of the nervous functions are limited to the crisis by itching and pain of the skin, we presume urticaria, erythema, or erysipelas, or spots or pimples of different forms, perhaps some of the varieties of impetigo;—whereas, in material diseases, that is, disorders tending to morbid products and disorganization, the perspiration contains morbid matter, and after some time, abscesses are formed more or less numerously.

The most unequivocal test of the efficacy of any therapeutic method is the great number of persons who recover, and the small number who die under its use. In this respect the hydropathic method of treatment holds a very elevated rank among therapeutic methods. Among nearly 3000 visitors who have been at Gräefenberg during the last two years, seven or eight only have died; and most of these, we are assured, were entirely exhausted previous to their arrival, and were viewed by Mr Priessnitz as extremely doubtful cases.

In what diseases is the hydropathic treatment proper? Is it useful in all, or are there only certain distempers to which it is applicable? This is by far the most delicate and difficult part of the whole subject. According to Mr Claridge, there is no disease to which the human frame is liable in which the hydropathic treatment is not appropriate, and necessary, and beneficial; and even several of the medical authorities whose testimony he has quoted, ascribe to it the same panaceal character. In the sixteenth chapter is given from Professor Mundé, a list of above 50 diseases, all of which are said to be cured by means of the water treatment at Gräefenberg; and the correctness of this statement is said to be confirmed by Dr Bigel, and generally ascertained by Mr Claridge. In this list are gout and rheumatism, inflammatory fever, nervous fever, intermitting fever, dropsy, cancer, cholera, dysentery, obstructions of the articulations, chilblains, inflammation of the chest, scrofula, rickets, scarlet fever, measles, and small-pox, erysipelas, hooping-cough, inflammation of the brain, ophthalmia, itch, and ringworm; mercurial diseases; syphilis; wounds, fractures; piles, dyspepsia, inflammation of the abdomen; weakness of the nerves, hypochondria, and hysterics, *tic douloureux*, diarrhœa, congestion of blood, spitting of blood, uterine hemorrhage, irregular menstruation, and leucorrhœa. In this heterogeneous and confused list of maladies, in which we have omitted not a few, it is quite clear that no attention is paid either to pathology or to methodical arrangement. Many disorders are put down close to each other which have no natural, pathological, or even symptomatological alliance. In others a series of symptoms are put down; and in some instances, symptoms which ought to have been associated as proceeding from the same pathological cause are separated from each other. Thus, after placing dyspepsia, indigestion, constipation, &c. under one head, we meet with weakness of the digestion and debility of the stomach under another, heartburn under a third, and nausea and sickness under a fourth. For these mistakes we know not whether Professor Mundé or Mr Claridge is answerable; but we say it in the spirit of friendly admonition, that a list of diseases less calculated to convince opponents and win proselytes to the hydropathic system of therapeutics cannot be imagined or contrived.

Into the merits or benefits of the veterinary practice we do not propose to enter. The medicine of brute animals is a subject neither despicable nor uninteresting. But we have enough to do with those of the human race.

The hydropathic system of treatment, as practised by Vincent Priessnitz, has created a great sensation throughout Germany; and the reputation of the author of the system has penetrated into most countries of Europe where medicine is an object of interest, and the means of alleviating pain and curing disease are prized. While the method has excited apparently the envy of some physicians, and been treated with contempt by others, persons of all ranks have flocked to Gräefenberg, in order to be cured of those sufferings which indulgence in the pleasures of the table, indolence, or hereditary feebleness have brought on them; and a few physicians, consequently, unable to resist the torrent, and anxious to ascertain the exact amount of the benefit received by the system, have visited the Silesian farmer, and have become converts to his principles, and propagators of the system. Among these are Bigel, Behrends, Mundé, Engel, Gross, Oertel, and some others, all of whom speak more or less favourably, some in terms of absurd and ridiculous enthusiasm. Dr Gross gives a detailed account illustrative of the method in his own person, which has certainly the merit of placing the peculiarities of the treatment clearly before the eyes. This we may insert if we find we have room in the Medical Intelligence Department, as our limits in this place will not permit. He appears to be one of the enthusiasts, and Mr Claridge certainly is another.

In the meantime, it cannot be denied that much good may be the result of all this panegyric of cold water; and though in the meantime its merits may, like those of other powerful and efficient remedies, be overrated, still we trust the time will come when the present ferment will subside, and the true and proper merits of the remedy, and its mode of application, will be admitted and put in practice.

Meanwhile, it is not unimportant to observe, that, in the course of thirteen years, Vincent Priessnitz has made L.50,000 Sterling out of the uses of spring water.

ART. II.—*The Transactions of the Provincial Medical and Surgical Association.* Instituted 1832. Volume X. London and Worcester, 1842.

THIS volume, though less bulky than any of its predecessors, contains several important and instructive papers.

The Retrospective Address, delivered by Dr Robert Streeten of Worcester, contains an ample and detailed view of the progress of the different departments of medical science during the previous year. Dr Streeten arranges his materials under the heads of Anatomy and Physiology, Embryology, the Pathology of the Blood, Pathology and Practice of Medicine, Therapeutics, Medical Jurisprudence, Medical Statistics, and Bibliography and Necrological notices.

This address forms the first part of the Transactions.

The second part is devoted to medical topography, and contains three memoirs, one on the Medical Topography of Exeter, by Dr Shapter, physician in that city; a second on the Climate of Herefordshire, as compared with that of London, by Lieut.-Col. Philip Yorke; and a third on the Medical Topography of Shrewsbury and its neighbourhood, by Dr T. Ogier Ward of that city; the first and third being continuations of former memoirs.

It appears that genuine continued fever, (the Synochus and Typhus of nosologists) is not a very common disorder in Exeter; for the average prevalence of this disorder, in relation to the population, is considerably lower than in many other large towns, as London, Edinburgh, Glasgow, Dublin, and Worcester.

Its prevalence also varies, as in other places, in different years and different months of the year. According to tabular statements given by Dr Shapter, in the course of ten years, from 1824 to 1834, it was most prevalent in 1807 and 1831, and least prevalent in 1833 and 1834; and the months more remarkable for its frequency were February, April, March, and January; and those least remarkable were, December, August, September, October, and November in the order specified.

It appears that fever with the well-marked disorder of the intestinal follicles is very rare in Exeter; but the most frequent complication is stated to be affection of the mucous membranes of the stomach and bowels, then the viscera of the chest, and more rarely the brain. Fever with pneumonic disorder is observed chiefly during the winter and spring. In 1839 and 1840, fever occurred with a hemorrhagic tendency; and many died in consequence of bloody discharges issuing from the intestines, and which no means appeared capable of restraining.

Intermittent and remittent fevers are said to be of rare occurrence.

Cholera appeared in Exeter in July 1832, when it was prevailing in London and Plymouth. No facts took place to show that it was contagious. It lasted above six weeks altogether, during the three first of which it was very fatal; and then gradually subsided. No epidemic cases were observed after the 1st of September. During its continuance about 400 persons were destroyed by it. It is remarkable, however, that in the ensuing year it again appeared in September and October, but by no means to the same extent or with the same severity. This is by no means the usual character of a contagious disorder. It seems to have depended upon atmospheric peculiarities and agency.

Lead colic or Devonshire colic is now extinct in this city and its neighbourhood, unless in painters or those accidentally exposed to the vapours of lead. The abandonment of the use of leaden cisterns or vessels in the manufacture of cyder has been followed by the disappearance of the disease, which can no longer with propriety be called the Devonshire colic.

The third part of the volume consists of essays and cases.

The first case given is that of a pin passing from the *appendix vermiformis* into the bladder, by Dr W. D. Kingdon. The second is a description of a tumour which had been formed in the middle of the *cauda equina*. For abstracts of these we refer to the Medical Intelligence.

The third article under this head consists of Further Observations on the *Variolae Vaccinae*, by Mr Robert Ceely of Aylesbury.

On Saturday, the 23d October 1840, Mr Ceely along with Mr Knight of Brill, found on the hands of a patient, aged 56, who had never had small-pox or been vaccinated, in the village of Oakley, two miles from Brill, at the north-west end of the Vale of Aylesbury, and sixteen miles from the town of Aylesbury, two ruptured vaccine vesicles with their central sloughs, apparently about the third week of the disease. These vesicles, according to the statement of the patient himself, had been contracted from his own cows. Upon examining them, viz. 8 milk-cows and two stirks; on two of the cows were the vestiges of from 25 to 30 vesicles on the teats and the remains of one vesicle on the udder; on two others the remains of about 13 or 15 vesicles; and on a fifth cow a blackish brown oval crust. One of the stirks appeared to have black-brown partially adherent crusts on the teats; but as she was with calf she could not be carefully inspected. The other stirk had escaped the disease.

In another milker named Joseph Brookes, aged 17, who had neither had small-pox nor cow-pock, they recognized a distinct vaccine vesicle on the right temporo-frontal region, another over the last articulation of the thumb, and a third on the radial aspect of the ring-finger, all just past their acme.

It was the opinion of the proprietor, Pollard, that the cows had been infected from human small-pox effluvia, to which they had been exposed.

Small-pox had, in point of fact, been casually introduced into the village of Oakley about the beginning of the month of June; and though this was opposed by Mr Knight with prompt vaccination, yet twelve cases of small-pox had occurred between June and October. Of these small-pox cases the last three were a woman aged 40, who had been satisfactorily inoculated in infancy by the celebrated inoculator Sutton, a young child, and a woman beyond the middle period of life. The two cottages in which these three patients resided during their illness were situate on each side of, and closely connected with, a long narrow close or meadow comprising scarcely two acres. The first mentioned patient, though thickly covered with pustules, was not confined to bed after the first appearance of the eruption, but frequently crossed the meadow to visit the other two patients, the woman and the child; the former of whom was in great danger with the confluent and malignant form of the diseases, and, indeed, died on Monday the 7th September, and was buried the same evening.

Next day (the 8th September) the wearing apparel of the deceased, the bed clothes, bedding, &c. of both patients were exposed for purification on the hedges bounding the close; the chaff of the child's bed was thrown into the ditch; and the flock of the deceased woman's bed was strewed on the grass within the close, where it was exposed and turned every night and for several hours during the day till the 13th September, a space of eleven days.

On that day the eight milk cows and the stirks were turned into the meadow to graze. For this purpose they entered it every morning, and were driven from it every afternoon to a distant meadow, to be there watered and milked, and to spend the night. Whenever the cows quitted the meadow in the afternoon, the infected articles above-mentioned, which had been withdrawn while the animals were within the close, were again exposed on the hedges, and the flock of the bed was spread out and turned on the grass, where it remained till next morning, when the cows were re-admitted.

At this time the infected articles were understood to be withdrawn. It appears, however, that they were not always so punctually removed as had been enjoined; and both the proprietor and the milkers affirm that, on one occasion, at least, they observed the bed flock on the grass and the cows amidst it, and licking it up.

At all events, while the animals were in perfect health on their first entering this close, viz. 13th September, within twelve or fourteen days after, five of the milk cows appeared to be suffering under heat and tenderness of the teats, and imbedded on the skin were distinctly felt small hard pimples, which daily increased in size and tenderness, and in a week or two rose into blisters, and quickly after formed brown and blacking scabs. When the teats were swelled, occupied with blisters, and very tender, severe consitutional or febrile symptoms were observed; viz. sudden sinking or loss of milk, ptyalism and shivering, frequent inflation and retraction of the cheeks, staring of the coat, tucking up of the limbs, and sticking up of the back, and rapid loss of flesh. The process of milking was then very difficult, disagreeable, and even dangerous; and on the 14th of October, the middle of the third week, the detachment of the crusts and loose cuticle, and the abundant discharge of purulent matter on attempting to milk, compelled the milkers to desist for the purpose of washing their hands. Soon after this period the cows became quieter and more manageable, as the swelling, soreness, and tenderness of the teats subsided; and finally, milking was performed with comparative facility; and on the 23d October, the time of the visit of Mr Ceely and Mr Knight, scarcely did the operation given any trouble, though here and there a teat seemed still tender.

Such is the history of the mode in which the disease was believed to have originated among the cows.

It is unnecessary to detail the progress and phenomena of the disease as they appeared in the human subjects. It is sufficient to say, that these phenomena presented all the usual characters of the vaccine virus when transferred from the cow to the human frame. The febrile or constitutional symptoms in the elderly patient were slight and almost imperceptible; and, with the exception of the pain and tenderness from affection of the axillary glands, he sustained no inconvenience, and was not confined a single day to the house.

The younger patient, Joseph Brooks, suffered much more severely. He had not been the subject of previous small pox or cow-pox. He commenced milking on Friday the 9th of October, his duty being confined to four cows, only one of whom had the disease in the shape of from four to six vesicles on each teat. These four animals he continued to milk occasionally till the 18th October, ten days, having milked them in that period six times. He then felt stiffness and tenderness in the site of the cervical glands and lymphatics; and on the 20th, found on the fronto-temporal region a pimple which he could not resist scratching. On the 19th, a red pimple, the size of a pin's head, appeared on the finger, and next day a very small one on the thumb. In neither situation was he aware of the previous existence of any wound or abrasion. On the 21st came on headach, general uneasiness, and pains in the back and limbs, with tenderness and pain in the course of the corresponding lymphatic vessels and glands, especially of the arm-pit; and these increased till the 23d, when nausea and vomiting took place. The right eyelids became swelled, and closed the eye for one day; but after this he became better. He was unable to work but never confined to the house.

From the vesicle on the fronto-temporal region, which was well-formed and characteristic lymph was taken and immediately employed in vaccination. This lymph was perfectly limpid and very adhesive. The vesicles in thumb and finger were not touched, but were allowed to pursue their course without interruption or modification.

The lymph taken from the fronto-temporal vesicle was transferred in the usual manner to those of his younger brothers, a lad older than himself, and two infants. The primary symptoms in the brothers and the young man aged 19, which were manifest on the seventh day, were mild. After the formation of the areolæ, the secondary symptoms were promptly induced, increased gradually, and declined regularly. The vesicles presented nothing remarkable till the full development of the areolæ, when they became very broad and flat, spreading outwards, distended with lymph bursting their walls, and, like those from which they were derived, followed by sloughs and deep slowly-healing ulcerations. In the infants, which were stout and healthy, with thick compact skins, the usual fretfulness and feverishness appeared on the evening of the sixth or seventh day, remitting in the morning and increasing in the evening, in proportion as the areolæ advanced, and declining with them. As usual, the vesicles presented nothing remarkable before the eighth day. In one the vesicles burst and sloughed; in the other they remained entire, leaving characteristic crusts and moderately deep fine reticulated cicatrices.

" In the subsequent transfers of the lymph the effects varied according to circumstances. In infants, with tense thick skins, the vesicles, though active, were perfectly free from inconvenience, yielding fine 'tamarind stone' crusts and regular scars. On children and adults, where the skin was thin, vascular, or irritable, upon the full expansion of the areolæ, the vesicles spread out broad and flat, and, yielding to the distending influence of their diluted contents, burst and terminated in sloughs, more or less deep, followed by a corresponding extent of ulceration; but where the skin was pale and thick, and especially if the patients were also pale and dark in complexion—conditions in every respect most suitable for the use of new lymph—then the vesicles were more compact, restricted, bold, and better defined, with proportionately less areola, and often not distinguishable at any period of their course from those induced by ordinary lymph. Here the crusts were of the ordinary size and form, and the cicatrices of the common depth and extent.

"The constitutional symptoms varied not less. In many infants the primary were scarcely noticed; the secondary, proportioned to the texture and vascularity of the parts, the local inflammation, and the temperament of the indvidual. In children, as usual, both were more frequently and more early noticed: the primary, on the sixth or seventh day; the secondary, at an early period, were marked with vomiting, diarrhœa, much fever, and occasional delirium. In adults the same early indications of constitutional symptoms, though not always, were often evinced; and during the secondary, as usual, much general complaint was made, some few keeping their beds a day or two. But the primary and secondary constitutional symptoms were comparatively mild in many individuals of the three classes above-mentioned.

"At the expiration of three months several patients were tested with variola, by inoculation, with no other than a trifling fugitive inflammation at the point of insertion, or a small vesicle resembling the modified vaccine in form, size, and course, containing a limpid adhesive lymph, raised on an indurated base, and terminating on the eighth or ninth day in a small, hard, blackish-brown crust, and unattended throughout its course with any constitutional symptoms." —Pp. 219–221.

The history now detailed seems quite conclusive in establishing the fact,—that the cows of Mr Pollard had contracted a disease from exposure to the virus of small-pox in the human subject; that this disease was that known under the name of cow-pock, all the usual characters of which it presented; and that the lymph of the vesicles thus formed, when transferred to the human subject, gave rise to the usual phenomena of cow-pock inflammation and ulceration, with the consequent degree of immunity from, and tutorial power against the poison of small-pox. Some objection might perhaps be taken against these conclusions, from the circumstance that clothes and bedding are supposed by some to be not susceptible of being impregnated with the infection of morbid poisons, while there is not distinct specific matter contained in them, that is, that these articles cannot become *fomites*, unless they are actually imbued with small-pox matter. It seems, however, doubtful whether this can be regarded as a valid objection, especially if the articles which have been in contact with the persons of patients, have been so a sufficient time, and if the patients have presented the symptoms of the disease in a well-marked form. As to all other points, Mr Ceely and Mr Knight appear to have taken great pains to remove all doubt; and, so far as we can perceive, they seem to have succeeded perfectly.

"The proprietor of the animals alleged as reasons for this opinion, first, the fact of the state of perfect health in which the cows entered the close; secondly, the existence of variolous effluvia within its precincts; thirdly, the time which elapsed from the exposure of the cows to such influence and the appearance of the vaccine disease on them; and, fourthly, the simultaneous or nearly simultaneous attack of all the patients. I need scarcely say that we spared no pains in our inquiries as to the validity of the statements in support of this opinion, and the accuracy of the facts upon which they were based. Hence the information here detailed was not deemed admissible till after thorough investigation and minute inquiry, by repeated personal visits to the scenes and the sources of it.

"There could be no doubt of the existence of variolous effluvia in the site and precincts of the close quite adequate to the propagation of the disease among human beings, had they been exposed; but whether sufficient to excite the vaccine in cows I really cannot pretend to say, having failed myself in attempts to infect two or three such animals at a time, with means not less potent, and under a closer atmosphere. The period at which the disease was stated to have been developed on the six animals was certainly remarkable, and called for careful scrutiny. The result of close and repeated inspections of all the cows, both at our first visit and several subsequent visits, was a conviction of the correctness of the alleged simultaneous occurrence of the disease on all the subjects at the time specified, a circumstance which increases the probability of the operation of one common cause. And here it is necessary to observe that, although the vaccine disease is sometimes epizoötic, and attacks one or two cows, at different farms, about the same time, I never remembered to have seen so many cows simultaneously attacked in one farm as in this instance. Most frequently we find the disease break out on a single cow, and spread slowly, by direct contact of the hands of the milkers, through a dairy. It is also important to add that the vaccine was not then epizoötic in the vale or neighbourhood, and of this fact I had the best possible assurance. The *aptha epizoötica*, as the disease is called, was then prevailing, and my knowledge of the state of the dairies in general, both from daily inquiries and frequent personal inspection, for the purpose of observing the phenomena of that disease, was more perfect than it had been for at least twenty years; in fact I had altogether despaired of seeing the vaccine disease for some length of time, in consequence of the existence of the epizoötic."—Pp. 221–223.

Mr Ceely then proceeds to advert to the validity of an opinion commonly entertained, that the stirk is not liable to the operation of the vaccine disease. Mr Ceely having previously shown that, by inoculation, the disease may be communicated to the stirk, adduced also various reasons to explain the circumstance that it could not otherwise be detected in that animal, adds that in Germany, upon two or three occasions, it has been seen in the stirk, without probable contact, and that, from personal observation, both the stirk and the heifer are liable to a vesicular disease of the teats and udder, which is very common in the milk-cows in the neighbourhood of Aylesbury. He seems at one time to have been in doubt whether this vesicular disease, to which he gives the name of the *verrucous* or *wart* vesicle, was the same as the vaccine, chiefly because the circumstances under which it occurred in these animals render it impossible to obtain a close inspection of the teats; but after examining the crusts and scars left by these vesicles some months afterwards, he says he could see no difference between them and the disease in the other cows.

From various facts also, Mr Ceely infers that among cows, as among the human race, there are different degrees of susceptibility to the vaccine disease.

> "I never recollect," he says, "to have seen a dairy visited by the disease in which two or three cows, equally exposed to casual infection, have not escaped. Moreover we know, by direct experiment, that some cows may be vaccinated or retro-vaccinated with facility; others with the greatest difficulty; some not at all. The phenomena of the disease were well described by the milkers. The primary or incursive symptoms so slight as scarcely to attract notice, as is most commonly the case; though in two instances—one some years since, the other more recently—there was considerable precursory indisposition. The heat and tenderness of the teats, with the presence of small hard pimples, deep in the skin, which gradually increased daily, with their inevitable and obvious concomitants, for more than a week before 'blistering' or acumination, were not less indicative of the vaccine than the correctness of the observers. At this period—the acme—they notice the constitutional symptoms, developed in all their intensity, and describe them with more than ordinary accuracy and precision; they certainly were more clearly marked than usual. Many contingencies, however, affect the development of the incursive and secondary symptoms; the chief are the season of the year and the actual condition of the animal, and the quantity and quality of food. The retraction and expansion of the cheeks is not always noticed by the careless unobserving milker; nor is the drivelling from the mouth. This last sign was so well marked that the proprietor feared the animals were about to be attacked by the *aphtha epizoötica*, (which was then prevailing in the adjoining farms,) where it is one of the first signs noticed, though not actually the first in existence, and depends on positive inflammation and vesication of different parts of the mucous membrane of the mouth. In the vaccine disease, however, this is not the case, at least here, where the disease is generally mild; for no vesicles are observed in the mouth, nor difficulty of mastication. The dri-

velling appears to be the effect of topical irritation in the seat of the disease—the teats and udder; for it is very well known that such a symptom does attend similar degrees of irritation from other causes and in other parts. The secondary constitutional symptoms were noticed in all the patients, including the stirk, and were proportioned in each to the amount of topical irritation. It was remarked, however, that the appetite seemed very little impaired, notwithstanding the wretched appearance of the animals, during the presence of the constitutional symptoms, and the sudden and notable loss of milk. To form some idea of the quantity of milk lost, we ascertained, from the dairy records, that in the first week of indisposition, six pounds of butter were deficient; in the second week, two pounds; in the third week, none. These may be deemed trivial and unimportant particulars, but their utility will be presently shown."—Pp. 225–227.

The diagnosis of the true vaccine vesicles and ulcers in the cow is not always a matter of facility. The ulcers are said to be generally distinguishable by a rounded elevation, more or less manifest of their outer margins, and circumscribed induration more or less extensive at their base, with proportionate depression in the centres of deeper ulceration, sometimes caused by a slough. It is necessary, besides, to take into account the stage of the disease, the texture of the tissues, and the site of the ulcers.

It appears further, that cows are liable to certain eruptive diseases, which bear a close resemblance to the vaccine vesicle and ulcer. Thus a disorder termed by Mr Ceely the epizoötic aphtha prevails in the vale of Aylesbury, and it was known that all the animals above-mentioned were attacked by this eruption on the 14th of November.

"This epizoötic seems to be a specific febrile eruptive disease, with catarrhal and rheumatic characters, comprising a cold, a hot, and a critical or eruptive stage. Its invasion is generally sudden. The cold stage is very short—a few hours—often unobserved; the stage of febrile reaction is quickly followed by patches of inflammation on the mucous membrane of the lips, gums, cheeks, tongue, and fauces, and about the nostrils and mouth, with congestion of the conjunctiva. These red patches, which are often overlooked or rarely observed, quickly run into irregular vesications or bullæ, containing a limpid pale amber-coloured fluid, and are attended with profuse salivation, difficult and even temporary inability to masticate, with proportionate constitutional disturbance. Similar vesications are often seen on the teats, especially on the involutions of the skin at their apices, also on their bodies. Still more frequently they are seen on the skin where it joins the claws, as well as on the interdigital membrane, whence they often extend under the horn, creating much mischief and causing excruciating pain by its detachment, &c.; but all these parts are seldom equally affected in the same subject. The constitutional symptoms continue for four or five days, when the topical irritation abates, and mastication is restored. It attacks all ages, and is often suddenly fatal to the very young. In the milch cow there is a notable diminution of milk, arising, in the first instance, from fever; secondly, inability to masticate—for the appetite soon returns or is not long absent; and, third, topical irritation. Now in the milch cows at Oakley there was this manifest difference in the severity of the constitutional impression produced by this disease—the *aphtha epizoötica*—indicated by the greatly diminished secretion of milk; the quantity of butter lost in the first week was thirteen pounds; in the second week, seven pounds. The suddenness of the invasion of the disease, as well as its severity, were demonstrated by the fact that on the morning of the 14th, the day of attack, the usual quantity of milk, (two bucket-fulls,) were obtained; but, in the evening of the same day, scarcely a quart. At this time the salivation, erection of the hair, tucking up of the limbs, &c. were obvious enough, though in the morning—an interval of eight or nine hours—no symptoms of illness were observable. The loss of flesh also was greater, and the animals were longer out of condition; but the season of the year was not without its influence in this respect, as well as in the restoration of the secretion of milk, which was then hopeless."—Pp. 232–234.

An account is afterwards given of the appearance of the *variolæ vaccinæ* at Dorton, another village in the vale, about twelve miles from Aylesbury, in May and June 1841. The phenomena which were observed there were in all essential points similar to those observed at Oakley; and, indeed, the lymph obtained at Dorton produced effects quite similar to that obtained at Oakley. The results of these observations are in all essential points so similar, that we think it unnecessary to enter into details regarding them.

In conclusion, we may observe, that the facts brought forward in the present memoir alone, and more especially in combination with those adduced in the former communication by Mr Ceely, must be regarded as quite sufficient to set this question regarding the relation between small-pox and the cow-pock completely at rest. It seems quite impossible to doubt, that exposure of the cow to the variolous infection or poison in the human subject produces the peculiar phenomena known and described as cow-pock, and that, whenever this disease appears in the cow, it must have proceeded either from the same disease in other animals with which the last affected was in contact, or from exposure to the variolous poison as it takes place in the human subject. This inference confirms the validity of the original views of Jenner, who conceived that the cow-pock vesicle was merely the small-pox operating on the system of the cow; and excludes for ever, unless some new facts are procured, the supposed origin from the grease of the heels of the horse. It is quite manifest that, unless it can be shown that the abscesses denominated grease in the horse, also proceed from the poison of small-pox, all pathological connection between grease and cow-pock must be discarded as unproved and altogether imaginary.

What then becomes of the facts recorded by Fermor, Loy, and others, which were conceived to prove that the vaccine disease, as it took place in the system of the cow, was derived from the grease of the heels of the horse? It is quite clear that both opinions regarding the source of the vaccine vesicle cannot be well-founded, unless in the sense above specified; and we are compelled to adopt, in the present state of evidence, the alternative conclusion, that all these facts must have been erroneous, and that all the experiments believed to confirm them must have been corrupted by some general fallacy.

Does the vaccine disease ever appear in the cow without the possibility of tracing its presence either to the same disease in other animals of the same genus, or to small-pox in the human body? This question, which is perhaps not very important, has, however, not yet been determined.

It is impossible to bestow too much commendation on the diligence, zeal, and perseverance with which Mr Ceely has conducted this inquiry. To those only who know how carefully and repeatedly it is necessary to make observations, in order to obtain what may be termed an uninterrupted chain of evidence, the difficulty and the labour of such an inquiry can be known. That to Mr Ceely this merit belongs, must be admitted by all who are acquainted with the subject. His memoirs contain the most ample and satisfactory view of the evidence on this subject now extant, and they may be confidently referred to with this intention.

The memoir is illustrated by several beautiful and correct coloured delineations.

The last article in the volume is the Report of Cases at the Chester General Infirmary during the years 1838, 1839, 1840, by Thomas Beavill Peacock, Esq.

This report is preceded by a table showing the cause of death, as ascertained by dissection, in 100 cases of disease or accident in the years now specified. From this it results that the greatest mortality is produced in Chester, as in other places, by fever, the amount of fatal cases being twenty, or one-fifth of the whole number dead. From the account given by Mr Peacock of the morbid appearances found in the bodies of those destroyed by this disease, it results that the disorder in the muciparous follicles of the ileum is a much more common affection in Chester than it is in this city. In this respect fever in Chester makes an approach to that which prevails occasionally in London, and to what we had an opportunity of seeing in 1831 at Manchester, as shown by our friend and correspondent, Dr Bardsley. At the present time, when the nature and prevalence of this lesion are objects of interest, the following description given by Mr Peacock deserves attention.

" In the abdomen it will be observed that the diseased appearances were more decided and more certain. The peculiar disease of the plates of Peyer, considered by some French writers as constituting the proximate cause of the typhoid fever of the continent, and on the presence or absence of which so much stress has been laid in the much agitated question of its identity with the fever of this country, occurred in an unusual proportion of the 17 cases examined. In seven of these ulceration was found either in the ileum, cœcum, or colon ; in an eighth the follicles were enlarged and distended as if with solid matter, and a ninth also presented them elevated above the surrounding mucous membrane, but without any appearance of morbid deposit. In one of these cases, which proved fatal on the tenth day, the plates of Peyer were distinct, and elevated above the adjacent mucous membrane, and on each oval space there existed six or eight elevated pimples, which felt rough to the finger, and, examined with a magnifying glass, were found to present an open aperture at the apex, and to contain a yellowish-looking matter: considerable vascularity existed in the mucous membrane around. In another, in which death took place on the thirteenth day, it is stated that the plates were very distinct, elevated above the surrounding mucous membrane, and presenting numerous small openings on their surfaces, with large ulcers here and there, near the valve of the cœcum. In a third, proving fatal on the sixteenth day, the plates were large, oval, and studded with openings along a considerable extent of the ileum, and near the cœcum the mucous membrane covering the whole plate was either ulcerated or so soft as readily to pull off. The vascularity in this case was distinctly greater around the plates than in other portions of the canal. The follicles did not present any appearance of solid matter in them.

" In four other cases the appearance of the follicles was entirely gone, and large ulcers with elevated and thickened edges and irregular surfaces occupied their places. These ulcers generally commenced a foot or two from the ileo-cœcal valve, and extended to the ascending colon. In some instances, however, they commenced higher up, and in one case were confined to the colon, in the whole extent of which they were found. In the small intestines they took the shape and direction of the plates, being oval, with their long diameter in the course of the canal. In the cœcum, however, they were extremely irregular in shape, and in the colon extended across the gut in the course of the folds of mucous membrane, forming in some cases almost entire rings. In the eighth case, the patient dying on the fifty-second day, the small intestines were studded with ulcers about the size of a sixpence, from the commencement of the jejunum to the lower portion of the colon. Their margins were depressed, and the surface smooth, and evidently in progress of healing. In several places the ulcers had perforated the intestinal tunics, and effusion of the contents of the canal into the abdomen had only been prevented by adhesions to the omentum or other portions of the viscera.

"I have several times examined the large follicles in an early stage of the disease with a powerful lens, and should conceive that what has been regarded by some French writers as a specific morbid deposit is simply the thickened follicular secretion, the result of inflammation; that process, so far as my observations serve me, preceding the presence of the deposit, and being in the early stage confined to the neighbourhood of the follicular plates. Ulcerations also would appear to commence on the orifices of the follicles, and then, being gradually enlarged, unite together, and form the large oval ulcer found in the advanced stage of the disease. I have never detected anything which bore the appearance of a slough in these cases. On examining the reports of these cases during life, I find that in one in which the plates were distinct, and had a few elevated pimples on them, with open apices, diarrhœa was present when the patient was admitted, on the seventh, and continued till his death, on the tenth day. In the next, in which the patient died on the thirteenth day, and the patches were found distinct, but with few ulcers, tenderness of the abdomen and tympanitic distension were present from the commencement of attack; and for the last three or four days three or four stools occurred daily. In the case proving fatal on the sixteenth day, the symptoms were those of general prostration, and some tenderness of abdomen, but evacuations were procured only by the exhibition of medicine, till the last day, when three stools took place spontaneously. In this case, it will be remembered, the ulceration was apparently commencing. In the others, which terminated between the seventeenth and twenty-second days, and in which ulcers occupied a larger or a smaller portion of the intestinal canal, diarrhœa existed for several days before death, and the indications of abdominal disease were present from the first. In one of these, a copious discharge of blood took place from the bowels on the fourteenth day; and in the one in which the ulcers had only been prevented perforating the peritonæal cavity by adhesions to the parts around, the symptoms of peritonæal inflammation took place on the ninth day. The case which proved fatal on the fifty-second day, and exhibited extensive intestinal disease in progress of cure, was characterized by repeated attacks of diarrhœa throughout its course."—Pp. 288–292.

The details now adduced show, as Mr Peacock observes, that "the fever of Chester bears, if these three years afford a fair specimen of the fever generally prevalent, an unusually close resemblance to the *dothinenteritis* of France." The period is probably not sufficiently lengthened to justify positive conclusions; but it can scarcely be doubted that so large a prevalence of this follicular affection must indicate something more than mere casual coincidence. In the absence of an extensive collection of facts comprehending the results of several years, it is rash and premature to offer any remarks in the way either of conjecture or explanation. But it seems manifest from the observations and dissections of Dr Bright and Dr West, in London, and what we know Dr Bardsley has observed at Manchester, that at certain periods and in certain years, this follicular disease prevails more than in others. Though the external febrile symptoms appear to be the same with those of ordinary typhus, yet it appears to us that they are not really and in all respects identical.

The facts hitherto ascertained by different observers in the same and in different countries, induce us to think that there are at least two kinds, perhaps more, of continued fever;—one with general affection of the whole vascular system, and especially the lungs and brain, but without marked intestinal disorder, the other with more evident intestinal disorder. The former seems to be essentially and always a contagious disorder. The other appears not to be contagious at all. The former seems to arise mostly in confined, ill-ventilated localities, and depends, perhaps, upon the local atmosphere and emanations conveyed by it from the persons of human beings. The latter seems to occur in the best ventilated situations, but is often manifestly connected with telluric or terrestrial miasmata. Thus it takes place in railway labourers, gardeners, and those much occupied in out-door work.

The residue of the report relates to the cases of consumption, diseased heart, and the surgical diseases and injuries.

The whole report is highly creditable to the author.

In conclusion, we are happy to observe, that the Association proceeds with spirit and judgment in this department.

Their report on the operation of the Poor Law in relation to the profession is interesting and instructive. Our limits, however, will not allow us at present to enter upon its consideration in such a manner as to do the subject justice.

ART. III.—*Elements of the General and Minute Anatomy of Man and the Mammalia, chiefly after original researches.* By FR. GERBER, Prosector in the University of Bern. *To which are added Notes, and an Appendix comprising researches on the Anatomy of the Blood, Chyle, Lymph, Thymous fluid, Tubercle, &c.* By GEORGE GULLIVER. F. R. S. With an Atlas containing 34 plates. 8vo., pp. 390, pp. 106 of Appendix, and pp. 71 of Explanation of Plates. London, 1842.

THE microscope has of late years opened up a completely new field of inquiry; and to it the anatomist, physiologist, and pathologist are looking with the most eager anticipations for the solution of many of those phenomena, which, in the present state of our knowledge, are left unexplained.

Of the many applications of the compound achromatic microscope, that to the examination of the minute structure and atomic constitution of the fluids and textures of the animal body is to the physiologist and pathologist the most important, whether we look to the mysteries in action and function which it may disclose, or to fertility of its results in illustrating the origin and nature of morbid action and morbid changes. Some idea of the fertility of the results obtained by the proper use of this instrument in able and competent hands may be obtained by considering how much has been learned in this department during the last ten years, by the labours of Ehrenberg, Müller, Berres, Henle, Mandl, Schleiden and Schwann, Allen Thomson, Purkinje, Valentin, Martin Barry, Retzius, Nasmyth, Owen, and Goodsir, and the present author. Of all this inquiry, however, one effect is manifest. Much if not all that we have hitherto learned of the anatomy of texture, or general anatomy, requires to be rectified and new modelled. Our knowledge, however correct, so far as it goes, or carefully obtained, must to a certain extent be imperfect and deficient, while we cannot penetrate into the mysteries of the minute structure of the textures. In carrying forward, therefore, the science of general anatomy to the present time, it is requisite to embody in it all that has been ascertained by the use of the most perfect instruments, and all that is confirmed by the united testimonies of different observers.

The present work is a valuable addition to our stock of knowledge of the minute structure of animal bodies, containing as it does many original researches of the intelligent author, and also valuable notes by the translator, who has already signalized himself by his diligence in microscopic pursuits. We are at present in possession of too few facts to enable us to decide on the comparative accuracy of the statements of the various authors who have written on the microscopic appearances of the various solids and fluids of the animal body; it would be a vain task, therefore, to compare these together, or, out of the confused, discordant, and often contradictory statements, to endeavour to decide as to the comparative merits of each. It appears that our purpose would be better answered by giving a short, and as succinct account as possible of the contents of the present volume, leaving it with our readers to judge of the value of the statements.

After a short introduction, in which the advantages of a correct knowledge of the structure and functions of the body is pointed out as the foundation of all medical science, Mr Gerber shows that, though the object of the anatomist and chemist be different, their labours tend to illustrate the same point. The organic constituents of the animal body are divided by the author into proximate or compound, and remote or simple, and he instances the blood corpuscle as "a proximate or compound organic element of the blood, the outer coverings and the nuclei of these bodies a remote or simple organic element of the same fluid." As he also adheres to the chemical division of bodies into simple and compound, perhaps he might have chosen terms which would be less liable to misapprehension than those he has selected.

The author then enters into a review of the chemical constituents of the animal body, and endeavours to show, that whilst inorganic matter is distinguished by the peculiarity of having its elements always associated in twos, or forming binary combinations, vegetable matters are composed of three elements, and animal matters of four. He holds that this is the cause, why the elements which form vegetable substances have a greater tendency to enter into new combinations, or are more obnoxious to decomposition than minerals, and animal matter again more than vegetable. We pass over, however, the author's theories on this subject, based as they are on a seemingly erroneous notion of the ultimate elements of which the animal tissues are composed. This will be apparent to every one when it is stated that he quotes the horny tissues as those "in which azote is almost wanting," when every chemist knows that they contain that element in at least equal proportion to fibre itself, and instances the brain as being the most highly azotized of all, whereas it is notorious that it contains a considerably lesser proportion of that element than most others.

We pass then to Mr Gerber's statements relative to the transformations and interchanges of organic matter. Fibrin, albumen, and gelatin are the most important proximate principles, and though during life they possess peculiar properties, they are so closely, allied that, under the influence of the vital force, the one is readily changed into the other; fibrin seeming to hold the middle place between the other two. All the principles of animal bodies are capable of being appropriated by plants as nourishment, undergoing transformation into vegetable matter; and the elements of plants, when consumed by animals, undergo new transformations, and are converted into animal principles. Organic matter, therefore, he assumes, is in a state of perpetual change, ever assuming new and appropriate forms. Liebig has fully proved the fallacy of such a statement; but, as an abstract of his researches is given in the present number, we refer to what is there stated.

After shortly mentioning that he divides the fluids of the body into the watery or serous, the oily, and those of a mixed nature, the author proceeds to enumerate shortly the various solids which are produced from these fluids. Under the first head, "Unorganized Solid Parts," he enumerates drops, as oil in saliva, oil in milk, various solid precipitates, crystals, and all calculous deposits, concretions, &c. Under the second head, "Imperfectly Organized Constituent Elements," which he characterizes as being a hyaline or vitreous substance, forming a considerable constituent element in the animal body, and as amorphous in itself, is ranged the crystalline lens, the pulp of the umbilical cord; and that the same hyaline substance exists as an intercellular substance, or an elastic bond of union in the cellular cartilage, cartilage of bones, canalicular or tubular structure of the teeth. Under the third head, "More highly Organized Constituents," fibrin and organic granules are included. Fibrine is the general formative element, or blastema, and is held dissolved in the serum of the blood. Fibrine in coagulating consolidates into a determinate hyaline substance, which, in the greatly debilitated, or in the dead body, falls into granules, or forms an aggregate granular mass. Plastic fibrine has, therefore, according to Mr Gerber, two forms, that of a vitreous substance, and that of granules. Other coagulating matters have the same properties; thus albumen, which he states is a more highly assimilated substance, when it sets gradually within or without the body, forms organic granules, which are not capable of a higher organization; but when it sets quickly, it forms a coherent mass, which shows no trace of organization. The fibrine of the blood forms, in setting, a true hyaline substance, which encloses the blood globules, precisely as that of cartilage encloses the cartilage corpuscles. When it coagulates in contact with the interior of the living body, immediately higher organic principles are proclaimed in the formation of compound corpuscles, which either swim free in the fluid, as the globules do in the blood, or appear as isolated bodies disseminated through a hyaline substance, or variously arranged without any common bond of union, and so attain their final development. Lastly, they present themselves as mere transition forms of more highly organized products, which, on the completion of development, entirely disappear. These corpuscles, it is stated, are the primary types of all higher formations in vegetable as well as in animal bodies; they are and were the universal organized condensations of the living plastic fluids. To these corpuscles the terms nucleolated nuclei, cell-germs or cytoblasts, and encased nuclei, have been applied.

In illustration of his particular views regarding the elements of organization, the relation which they hold to each other, and the supposed organization or evolution of the elements of animal bodies out of the cell germ, a very curious table is appended by the author; but for this we must refer to the work itself.

The granules so universally met with in the animal body, the author regards as composed of albumen. There is scarcely a watery or mixed animal fluid without its granules; wherever albumen in solution is met with, there are granules present. In the chyle, so long as it is contained in vessels beyond the mesenteric glands, granules only, from the 500th to the 400th of a line in diameter, are discovered, but after the fluid has passed through these glands, it is found to contain cell germs or lymph corpuscles. In all transudations of the *liquor sanguinis* upon internal surfaces, or into the tissues, cell germs are produced, and wherever cell germs perish, there appears to be a retrograde tendency to the formation of granules. From the exudation globule is formed the pus globule, which very speedily falls into its constituent granules. Granules are often seen collected into heaps or masses, when they form aggregation corpuscles. The elementary granules are then held together by a fluid, and separate when this is attenuated in any way. When granules unite in rows like strings of beads, a granular fibre is produced. Several of these fibres lying parallel and in apposition form a granular fibrous cord if cylindrical, or a granular fibrous bundle if flat. When the same fibres are seen in two directions, they form a granular membrane.

The fourth head is necessarily the most important, as being devoted to the consideration of the "completely Organized Constituent Elements, parts endowed with inherent life, and capable of peculiar evolution." And first, of the cell germ, encased nucleus, or cytoblast. This structure, which has been long known as a general constituent part of the structure of vegetables, has been also of late said to be equally common in animal structures.

The author describes the cell germ as in the beginning a lenticular or cake-like corpuscle of a yellowish-white or dull-red colour, which encloses a nucleus, and is perpetually produced in the shape of an organic precipitate in the fibrinous vital fluids, the blood and lymph. The size of this organ seems to bear a general relation to that of the blood globules, according to Gerber; but in a note Mr Gulliver states that such is not the fact, as, in most animals he has examined, these fibrinous globules were of equal size, though the blood globules of the different animals were of very various sizes. The cell germ either remains as it has been described, or there is a vesicle developed upon and around it, which is called a cell. In the chyle and blood this body floats at liberty; it is, however, commonly met with as a principal ingredient of consistent exudations. When the cell flattens, the cell germ occupies the middle as a nucleus, or there is a nucleolus evolved within a nucleus. The cell either remains as such, or it is a mere transition form into other and more highly organized products.

The author next passes to the consideration of the chyle, and states, that if we follow this fluid from the moment of its appearance, with an eye directed at once to its chemical and microscopic analysis, and mark the various changes which its chief constituents undergo, until they appear as cytoblasts, we perceive they advance from binary to quaternary combinations of elements. Near the intestine, the author states that the chyle consists of water, in which a little albumen and salts are dissolved, whilst its white colour is owing to a multitude of oil globules suspended in it. This appearance is differently accounted for by Mr Gulliver, whose researches on chyle will be noticed afterwards. As the chyle approaches the mesenteric glands, the quantity of fibrine appears to increase partly at the expense of the albumen, partly of the oil globules, so that at these glands there is remarked a commencing precipitation of albuminous granules. It is inferred, that in the mesenteric glands some of the albumen becomes changed into fibrine, as the chyle when drawn from the vessels, after passing these ducts, separates into a solid coagulum and a serous fluid. The central lacteal vessels at a short distance from the glands contain a number of extremely delicate, scarcely coloured lymph corpuscles, which are in fact cytoblasts or blood-globules in process of formation. These go on increasing in number, consistency, size, and red colour in their progress through the thoracic duct,—the coagulability of the chyle, and the firmness of the coagulum increasing in the same proportion.

Lymph is described very shortly as being of still more various constitution than the chyle, and as being viscid in consequence of its containing the dissolved elements of the system. Albuminous and oil globules are sometimes present, sometimes absent altogether, and it only coagulates if there should be any fibrine present.

The blood next engages the author's attention, and, after enumerating the known properties of that fluid, stating that it appears with the earliest traces of life in the embryo, enumerates the various organic elements met with in that fluid, viz. blood globules, separated nuclei of blood globules, and albuminous granules, and in the frog minute entozoa.

In all the vertebrata the blood globules are flat, rounded, or elliptical discs, and, like all cytoblasts, contain a nucleus in their centre of the same general form as the globule itself. Generally speaking, the blood globules and their nuclei are rounded in the mammalia, elliptical in birds, reptiles, and fishes. The nucleus is described as projecting on either side of the disc in the frog, and in the spider the author observed the blood globule to have the form of a meniscus. The size of the blood globules vary in different classes of animals. In the human subject their diameter is from the 300th to 250th of a Paris line; that of the nuclei being about the 400th of a Paris line.

The cell or capsule of the blood-globule is, like the nucleus, transparent, and includes the hæmatosin or red-colouring matter. The author asserts that it is this capsule which is the bearer of the carbon from all parts of the body to the lungs, and of the oxygen from the lungs to every part of the body. The experiments on which this statement is founded are not however given.

The nucleus of the blood-globule is described as the most puzzling part of all the structure, as " not only is it of different sizes absolutely, but it is so relatively to the shell or capsule even among mammals." One or two instances are given of this, and as the most striking, that of the fœtus of the mammalia, whose blood-globules, as well as nuclei, are comparatively larger than in the adult animal.

Several circumstances are stated relative to the number and character of the blood-globules in different diseases, as the loss of colour in the chlorotic; their paucity in anemial states of the system; their increased proportion after exudations of the *liquor sanguinis*, or of serum, &c.; a few circumstances are also mentioned with regard to the exudation, true pus, and ichor corpuscles; but, as the subject is treated more at large afterwards, it seems unnecessary to notice what is here stated.

The author then enters on the most important part of his subject,—the " origin, evolution, and ultimate structure of the living constituent elements of animal bodies, and of the animal tissues." In order to render his meaning more intelligible, he prefaces this part of his subject by a few general considerations regarding the motion of fluids, the gravitation of fluids, hydrostatic or passive congestion, and active congestion. Mr Gerber, after briefly stating that nutrition, secretion in glands, &c. takes place by a normal endosmotic transudation of fluids through the coats of the vessels, passes on to the consideration of the morbid escape of fluids by exudation from the vessels. Three forms of exudation he allows to be caused by inflammation,—watery or serous matter, plastic matter, and sanguinolent matter, which last forms the transition to hemorrhage.

In the serous exudations, albuminous granules are stated to be of frequent occurrence. In the plastic exudations a yellowish turbid fluid is found in the affected cavity, having fine flocculi of a pale yellow colour floating about in it, or adhering to the boundary parietes. It is stated that, if the coagulable lymph is in large quantity, it is a sign that the exudation has been rapid, and that if death occur, this hyaline substance quickly becomes granular or even dissolved in the serous fluid. Mr Gerber differs from Mr Gulliver and other observers, in stating that true pus globules are never met with in shut cavities unless there be some external wound. The pale-yellowish bodies which are met with in the serous fluids of shut cavities, he regards as "corrupted fibrine, a sign of approaching death."

If the inflammation ends with the exudation, and the animal recover, the loose floating particles of fibrine become dissolved in the serum, and are removed by absorption along with it. Those masses, however, which are attached, assume a bright-yellow colour, and are stated by the authors to consist of connected exudation globules, which form in from twenty-four to thirty-six hours after the exudation. These corpuscles he describes as in every respect the same as the lymph corpuscles, and from being laid over each other in superimposed layers, constitute membranes bearing a strong resemblance to tessellated epithelium, especially when the connecting medium of the corpuscles has disappeared, and allowed them to press against each other. Some hours after this, a tendency to the formation of a fibrous structure is observed; the globular parts arrange themselves in lines, each acquiring a spindle-shape, being lengthened in the direction in which they form the fibre. The nucleus of the exudation globule still remains visible in each, and either subdivides into several granules, or has a new nucleolus evolved within it. An interposed hyaline substance still remains interposed between the fibres. The author states that occasionally the organization just described remains stationary, or undergoes no further development, as it is seen to do in the sheaths of the soft nerves, and more delicate vessels; but, in other cases, the cellular fibrils are transformed into round filaments. As this process goes on, the intercellular fibrils get longer, whilst the fusiform nuclei get smaller, and at length entirely disappear.

Even before the formation of the round filaments, the author states, blood-vessels may be seen forming a capillary net-work through the effused plastic lymph. Mr Gerber is not very explicit as to how these vessels are produced. We gather, however, that arborescent streaks, which inosculate with one another, appear, but, before being completed, pale-coloured cytoblasts are produced within them, which are afterwards pushed, by the current of blood from the neighbouring artery, into the nearest vein. Such, then, is the process which Mr Gerber states the plastic lymph undergoes during its transition to a vascular membrane. The same exact process, he says, lymph undergoes whenever it is thrown out, whether on the surface of membranes, between different organs, or in the walls of shut cavities.

The "formation of pus, and the reproduction of organization in suppurating wounds or sores" are next noticed. Clean incised wounds are described as healing in a few hours by the first intention, in virtue of an effusion of fibrine, which fills up the accidental hollows between the cut edges, producing cytoblasts, which again are transformed into cells, and these again undergoing their final organization. Wounds, however, with a loss of substance, heal by suppuration and cicatrization, the process in which case is described shortly as follows: "After having bled to a greater or less extent, the wound becomes stiff and painful and dry; an exudation of the *liquor sanguinis* is then established from the entire extent of surface, and this goes on incessantly till the injury is repaired. The fibrine as it coagulates on the surface forms exudation globules or cytoblasts, many of which cohere in layers, and compose the false membrane that finally invest the entire superficies of the sore. The layers of globules in most immediate contact with the living tissues become cells, which then undergo farther transformation in accordance with the nature of the structure to be reproduced; those layers of globules again, which are more remote from the living parts, become pus-globules, and then mingled with a small quantity of serum compose true or laudable pus." P. 90.

A number of radiating lines are described appearing on these pus globules, appearing to divide the globule into six or eight segments, whilst the nucleus appears to fall into from two to four pieces. When pus is kept it is stated that it gradually falls into those granular elements of which it is composed. Pus globules are usually larger than those of the blood. From the author's chemical analysis it results that the younger the pus, the larger is the quantity of fibrine it contains, and the more mature the pus, the larger the quantity of fatty matter. He hence infers that pus stands in direct contrast with chyle, in point both of organic and chemical constitution. As we before remarked, however, no weight need be placed in the author's chemical statements, or reasonings founded thereon, as he has formed very generally erroneous views of the elementary composition of the tissues and fluids of animal bodies.

Under the head of "false pus," the author includes all those purulent-like secretions which do not appear in connection with the reproductive process. He says the form of this kind of pus differs from true pus; but he neglects to inform us in what that difference consists; whilst, on the other hand, he allows that true pus globules occur in close cavities, in secretions from the kidney, lungs, breasts, &c. The fluids of *bullæ*, *phlyctenæ*, and pustules he does not allow to consist of true pus, but of "a serum with albuminous granules;" true pus only appearing if the skin is so deeply injured as to require the reproductive process for its renewal.

The ichorous discharge from unhealthy sores is described as consisting of the altered constituents of the blood. The *liquor sanguinis* coagulates in granules, and the blood globules becoming puckered, corroded, and broken down, constitute the ichor corpuscles.

The various granular-looking and fluid matters occasionally formed in cysts are described as differing from true pus, and as being in general composed of exudation corpuscles, which lose their serous fluid, and then form a dry substance, which is much disposed to run to suppuration, but is also convertible into fibrous tubercle.

The author describes very minutely the process by which the cicatrization of the sore is effected, which is, generally speaking, the same as that above noticed relative to the organization of plastic lymph, with the exception that the cytoblasts most remote from the surface of the wound burst, fall into granules, and become transformed into pus globules as above described. The granular appearance of a cicatrizing sore is attributed to the convolutions of the new blood vessels and nerves beneath the newly formed plastic layer.

The various appearances which the ovum presents, from its first appearance in the fœtus, till its full development in the adult, and its impregnation, are minutely described, and the addition of its various component parts traced. The general development of the impregnated ovum is then very briefly yet succinctly described, showing that the process of evolution appears to consist in evolution from cells.

After shortly pointing out the analogy which late researches seem to show exists between animal and vegetable development, both appearing to arise from cells, Mr Gerber proceeds to describe the different constitutions of these bodies, such as the position of their nucleus or cytoblast, their fluid albuminous contents, the appearance of granules in this fluid, the origin of the nucleolus within the nucleus, the different forms of cells, their elongation into fibres, or tubes, &c. As the result of the present amount of our knowledge on this subject, he quotes from Schwann the following classification of the animal tissues,—an arrangement, however, which he does not follow in the present volume.

" *1st Class.*—Isolated independent cells. To this class belong especially the cells of the various fluids, lymph corpuscles, blood corpuscles, mucus corpuscles, purulent matter corpuscles, &c.

" *2d Class.*—Independent cells united into continuous tissues. To this class belong the whole of the horny tissues and the crystalline lens.

3d Class.—Cells, only the walls of which blend together. Cartilage, bone, teeth.

4th Class.—Fibrous cells or cell-fibres. Cellular tissue, sinewy tissue, elastic tissue.

" *5th Class.*—Cells, the walls and cavities of which are alike blended and united. Muscles, bones (?) capillary vessels."—P. 131.

Mr Gerber commences his description of the tissues with that of the *pigmentum nigrum*, which he states consists of minute granules which appear pretty evenly dispersed through a hyaline substance. In the choroid coat these granules, either form aggregation-corpuscles, or are enclosed in cells to which they give their dark colour. These pigmentary cells, either form groups, as in the skin, or continuous membranes, as in the choroid coat, where they assume polyhedral forms. It is also stated that these pigmentary cells often undergo elongation into hollow fibres. Nucleoli often appear within the nuclei, but both these disappear in horn.

The fat vesicles or cells, with their nuclei, are shortly described, and an important physiologico-chemical fact is stated, viz. that ether removes the fat from its vesicles without rupturing them.

The horny structures, of which the epidermis is the most important, are described as consisting of several layers of cells, which are produced upon the corion, as a consequence of an uninterrupted process of exudation, accompanied by a like continuous formation of cytoblasts and cells. Those in contact with the corion are spherical, but flatten as they approach the surface. Intercellular matter is said rarely or never to be met with between the cells of the cuticle. Hoofs, claws, nails, horns, &c. are more strikingly developed portions of this tissue, whilst cutaneous glands and hair are regarded by the author as involutions of the same.

The sebaceous glands are stated to be merely involutions of the epithelium or cuticle, serving the double purpose of excretory canals, and sheaths for hair. In some the excretory duct is described as having a cork screw twist in its passage through the thick cuticle and terminating in the corion in one or two moriform or botryoidal glands.

The sweat glands again project into the subcutaneous cellular tissue, their excretory duct simply piercing the skin. It seems not to be well ascertained whether they too consist of involutions of the cuticle. The secreting part of the apparatus consists of a congeries of sacculi of an irregular mulberry form, and the excretory ducts are generally straight.

Hairs are epidermic threads implanted in the substance of the corion, or horny cylinders produced by involuted and revoluted processes of the epidermis. The epidermis is described as being reflected funnel-wise into the substance of the corion, so as to form the excretory duct both of the sebaceous gland and of the hair. That destined to form the sheath of the hair, however, passes deeper into the corion, where it becomes expanded, so as to form an oval-shaped cavity, becoming again contracted below. At this point it is reflected, when it again swells out and forms the proper capsule of the hair-bulb, receiving in its interior by the opening left below, the nerves and vessels which penetrate the pulp. The reflected epidermis then forms the shaft of the hair, which, advancing through the excretory duct, appears on the surface as the hair. It is at the point where the epidermis suffers the reflection that the cells are added whose development and contraction form the hair. Each hair thus appears to be a horny tube, enclosing a central medullary thread, the appearance or character of which is not described.

The tactile hairs or whiskers of animals differ in nothing but in lying deeper, generally in the subcutaneous cellular substance, and being surrounded by a hollow nervous bundle.

Nails, claws, &c. are described as being formed essentially in the same way as hair, and as consisting of a congeries of polyhedral nucleated cells without intercellular matter; as they become exposed to the air they harden, when the nuclei and nucleoli of the cells disappear. When these parts are coloured pigmentary cells are disposed through them with a tolerable degree of regularity. The posterior ends or roots of the nails are enclosed between duplicatures of the corion, and it is here the filiform papillæ, which are the source of the growth of the hair, are met with. No sebaceous matter is poured along the sheath of the nail; its sheath consequently remains adherent to its surface. In man this adhesion would stop the growth of the nail, were it not that new cells are continually being added by all the surface of the sheath adherent to the nail, so that, as it advances forwards, the nail is continually receiving new supplies of matter to its thickness.

The hoofs of animals are described as having the same general mode of growth as the nails, only that as those parts are destined to support the weight of the body, a peculiar arrangement occurs by which the formative papillæ and vessels are secured from the effects of injurious pressure, and fine canals, which seem to be the ducts of sebaceous follicles, run through the length of the hoof from its crown to its bearing edge. They are stated to be filiform and spirally twisted in the horse, but the spinal canals have a straight course.

The horns of the ox, sheep, &c. are stated to have the same structure and same mode of development as the hoof of these animals; vessels, however, are seen to run from the point of the bony core to the extremity of the horn, through the horny substance. The walls of the horn are composed of concentric laminæ, with longitudinally disposed ridges and intervening furrows. Sebaceous glands, however, have not been discovered in them.

Recent investigations have shown that all the naturally free surfaces of the body are covered with a cuticle, which has been termed epithelium. This epithelium is composed of cells, the nuclei of which do not, however, disappear. The forms presented by these cells are very various, and have led to the subdivision of these into tessellated, cylindrated, and ciliated.

The tessellated epithelium is stated to cover all the more delicate membranes of the internal surface of the body, as the finer mucous, the serous, and synovial. It is composed of lenticular cells, imbedded in an intercellular substance, and containing nucleolated nuclei in their interior. This form of epithelium lines all the blood-vessels and lymphatics, and may be easily demonstrated on the walls of the heart and great vascular trunks. When mingled with the blood, they are said to be difficult of detection, as their size and form corresponds so accurately with that of the blood-globule. In the serous and synovial membranes, however, the cells are stated to be of larger size. Those lining the ventricles of the brain are said to be in addition furnished with ciliæ, which are attached along the edge of the cell to little warty-looking excrescences.

The cylindrated epithelium has only been met with on mucous surfaces, the cylinders being placed in a position perpendicular to the plane they cover. Their form and size seem to vary according as they contain one or more nuclei. Their mode of development is described to consist of the cells from which they are formed becoming raised, like hemispheres, above the general surface. This enlargement goes on till they assume an ovoid form, when the base becomes pediculated, after which the corpuscle becomes campanulate and then cup-shaped. Ciliary prolongations are often seen covering the crown of the cup of these cylinder epithelium cells. They are met with in many parts of the body, as in the nasal cavities, palate and fauces, larynx, bronchi, vagina, uterus, &c. The margin of the cylinder on which the cilia are fixed is generally, thickened, and the author thinks the cilia owe their motion to fine muscular fibres.

It is shortly stated that the mucous and other glands opening on the surface of mucous membranes, receive, like those of the surface of the skin, a lining of epithelium, and that the mucous glands, in point of structure and general appearance, are almost identical with the sebaceous glands of the skin.

Cartilage next engages the author's attention, and this he divides into permanent, or that which remains as such during life, and ossific, or that which becomes transformed into bone. Three kinds of structure exist in these: 1. Cellular cartilage, composed of cells or cartilage corpuscles, as he calls them, scattered through a hyaline or intercellular substance. 2. Reticular cartilage, the cells or corpuscles being scattered between the meshes of a reticulated fibrous matter. 3. Fibrous cartilage, composed of a net-work of fibres and fasciculi. The cartilage cells lie most closely together, when the cartilage is of recent formation.

In permanent cellular cartilage, it is stated that the first appearance the structure presents is an apparently uniform granular aggregation of cytoblasts, which become changed into nucleated cells. At first intercellular matter is only seen where the rounded cells leave spaces between them, but rapidly increases, and in greater proportion too than the cells themselves. The cells are thus separated from each other and assume irregular shapes. The capsule of the cell cannot then be distinguished from the intercellular vitreous or hyaline substance. The cartilage cells, then called cartilage corpuscles, are seen to be filled with a softer substance, in which nuclei are visible. It is stated that new cells are evolved from the parent cell, and also that cells are seen to arise in the hyaline substance, whose origin cannot be traced. Cartilage of the ribs, the ensiform cartilage of the sternum, alæ, and septum of nose, are examples of this form of cartilage.

In the formation of reticular cartilage it is stated that, as soon as an isolating intercellular substance is visible, new cells are evolved in the primary or parent cells, and between these new cells a new hyaline substance. The primary intercellular substance is at the same time transformed into an elastic reticular net-work, in the meshes of which lie completely formed cells, and older and younger nuclei. The root of the *concha auris* and the epiglottis are examples of this form of cartilage.

The fibrous cartilages, as consisting of parallel fibres, are noticed in another part of the work.

The author's views of the ossification of cartilage are, that the process is the same as that which occurs in the bones of the embryo, and in the renovation and repair of broken bones. To throw light, therefore, on the early process, he first details what occurs during ossification of the costal cartilages. At the point where ossification commences the cartilage cells are found collected in clusters, in all other parts regularly disseminated through the cartilage. These clusters are ever more and more distinctly surrounded and enclosed by a delicate line, probably, the author thinks, indicating the boundaries of the primitive cell. The homogeneous intercellular substance becomes opaque, from the deposition of earthy salts. Bone corpuscles then make their appearance; the cartilage corpuscles disappear, and bone cells are produced in their place.

The author states that all bones of the body have cartilaginous bases or rudiments, but Mr Gulliver, in a note, adds, that certain flat bones, and the shafts of the long ones, never appear cartilaginous before ossification, but that the ossification commences in a soft membranous basis. Ossification, according to the author, proceeds in the fœtal bone-cartilages exactly in the same manner as above-noticed relative to the costal cartilages of the adult. The cartilage corpuscles, ever more and more crowded together and compressed, cede the space they formerly occupied to the increasing osseous substance; this grows more and more opaque, from the deposition of earthy salts, bone corpuscles make their appearance, then vessels, and the bone is complete.

A delicate slice of a cylindrical bone exhibits parallel canals, which anastomose with each other, and contain the blood vessels. The spaces between these, constituting the proper bone substance, consist of bone cells, the nuclei of which are termed bone corpuscles. The bone corpuscles are elongated, but have no obvious nucleoli. Fine radiations extend from these on every side to the confines of the cell. The bone cells do not appear to have any vitreous substance between them, but surround the vessels in concentric laminæ, and lie betwixt them with a more or less parallel arrangement. In flat bones, again, the vessels form a common net-work. The spongy bones in general consist of a reticulation of compact bony structure which encloses cavities full of fat cells. No nerves seem to exist in bones other than those which penetrate alongst with the blood-vessels, and seem to belong to them.

The chemical analysis of bone is given, to which Mr Gulliver, in the form of a note, gives some valuable additions, showing that as yet we know little or nothing of the laws which regulate the relative proportions of earthy and of animal matters, the jaw of a fœtus and of a child yielding as great or a greater proportion of earthy matter than that of the adult. Several general details regarding the bones are given, but on these it seems unnecessary to enter.

The teeth next engage the author's attention, but as we have so lately in this Journal noticed the most recent investigations on this subject, and as Mr Gerber has not only added no new facts, but seems unaware of several of the later discoveries, it is unnecessary to enter into details. It is sufficient to state, that he recognizes them as evidently appertaining to the cuticular formations, and bearing a close affinity to the nails and hair.

The author then takes up the subject of the tissues,—a term which he restricts to those structures which are made up of fibres and filaments, but excludes therefrom those denominated hyaline structures, or structures formed of cells. Under the proper tissues he includes the elastic, fibrous, and filamentous tissues, the last of which he subdivides into the cellular, tendinous, ligamentous, fibro-cartilaginous, contractile, and muscular.

After detailing the chemical and physical properties of the elastic tissue, the author states that its mode of development differs essentially from that of the other fibrous tissues, bearing a great affinity to that of the ossific cartilages. It is stated, that, in the embryonic mass of cells, from which this tissue is developed, stratifications are observed; the cells suffer elongation in the direction of the future fibrillation, and become flatly fusiform, but do not cohere; they remain isolated, with sharp pointed extremities, amidst the consolidating intercellular substance. New secondary cells are abundantly produced in the parent cells of the original tissue. The intercellular substance becomes independently organized, and the cells either disappear or are dissolved, or remain for life. In the mode of connection of its fibres this tissue is said to bear the strongest resemblance to the capillary vascular net-work. When fully developed the fibres consist of prismatic rigid fibres from the 550th to the 400th of a Paris line in diameter, and inosculate at all angles. In the *ligamentum nuchæ* the meshes are so long relatively to their breadth, that they only resemble a slit; in the coats of the arteries, however, the meshes are polygonal or round. This tissue occurs wherever a high degree of mobility and elasticity is required, and the fasciæ, skin, mucous membranes, fibrous cartilages, and many even of the cellular cartilages, ciliary ligament, iris, veins, &c. are mentioned as structures in which it is always present, in addition to those better known.

After a brief detail of the physical properties and general appearance of cellular tissue, the author states, that, in addition to its division into the fibrous and fascicular, it may with propriety be subdivided into the investing and connecting cellular tissue, and the intimate or component cellular tissue. The perfectly developed cellular tissue consists of extremely fine and transparent smooth cylindrical fibres from the 1600th to the 1200th of a line in diameter, which commonly run in fasciculi of wavy lines. Eight different forms are mentioned in which the fibres of this tissue are compounded, forming flat cords, parallel fibres, membranes, net-works, &c.

The investing cellular tissue is the substance which connects one organ with another, and forms the areolæ which contain the fat vesicles, &c. It is stated that the same substance enters as an essential element into the structure of the parenchyma of many organs, connecting the several particles together so as to form a whole, such as binding the glomeruli of glandular structures into glands, the primary muscular fibres and bundles into muscles, and the primary nervous tubuli into nerves. Mr Gulliver adds in a note, that with regard to one muscle at least, viz. the heart, he has satisfied himself that no cellular substance binds its fibres together, that organ being composed entirely of muscular fibres, without visible intermixture of any other tissue whatever.

The cellular substance is often met with in its transition state from the cell to the filament, in which state it remains stationary in some organs, as around the finer blood-vessels and the tubuli of nerves. The fibres then present regular varicose dilatations at pretty regular intervals.

All the serous and synovial membranes are formed of densely compacted membranes of cellular tissue, which only differ from the smaller cavities of the looser investing cellular substance, in having their free surfaces overspread with a tessellated epithelium. Schwann had previously remarked that the cellular fibre was divisible into a plurality of fibrils; but the author states that he has never been able to see this distinctly.

Tendon is stated to differ little from cellular tissue excepting in its greater opacity, the more invariable parallelsim of its fibres, its greater consistency and rigidity. In its development it resembles cellular tissue, for the minute details regarding which the author refers to what he stated of the development of fibrine. The tendons in the fœtus are said to be formed at an earlier period than the cellular substance. In the long tendons the fibres are "more immediately and intimately in contact," but in other places they are plentifully mingled with cellular substance. When the tendinous fibres unite in cords or bundles and cross each other, they form the tendinous structures, as sheaths, fasciæ, membranes, and ligaments.

The author divides the Tendinous structures into, 1. Long tendons or sinews, which serve as the origin and insertion of muscles and have their fibres parallel to the length of the muscle. Where the tendon meets the muscle the primary muscular bundle is conically pointed, and the fine tendinous fibres arise from the whole cone. 2. Tendinous expansions, aponeuroses or fasciæ, which are the tendinous continuations of flat or membraniform muscles, cover and enclose other organs. These are either entirely tendinous, and the fasciculi run in one and the same direction, as in the oblique muscles of the abdomen, or the fasciculi cross in different directions, as in the diaphragm, or they are mixed with elastic tissue, as in the external oblique. 3. Tendinous sheaths composed of a dense net-work of fasciculi, as in the fasciæ of fore-arm, thigh, &c. 4. Tendinous membrane strengthening the serous and synovial membranes. 5. Peculiar fibrous membranes which surround different organs, generally composed of an admixture of tendinous fibres and elastic tissue. The fibrous structure of erectile organs, the *dura mater*, *tunica albuginea*, periosteum, &c. are examples of this class. 6. Fibrous bands or ligaments, as the ordinary, the round, crucial, &c. ligaments. 7. Fibro-cartilage, consisting of a dense intercrossing of fibres with a considerable intermixture of elastic tissue. This structure unites all the bones which are articulated by synchondrosis, as the vertebræ, &c.

Under the head Contractile Fibre or contractile tissue the author includes those fibres situated immediately under, and even, he states, in the skin itself, which, on the application of cold, and under the influence of mental emotions, cause the corrugation of the skin and the erection of the hair. He regards this structure as the transition form between muscle and the tendinous structures.

The Muscles are treated by the author under three heads,—those belonging to organic life, those belonging to animal life, and those of a mixed nature. After noticing the usual characters of the organic or involuntary muscles, he states that they consist of yellowish-red transparent fibres, which, though cylindrical when single, are flat or prismatic when united in bundles, from the pressure of the other fibres. They seldom run in straight directions, but are usually bent sinuously, and under the mucous membranes the fibres and bundles open and close so as to form plexuses or meshes in which mucous glands lie imbedded. The fibres lying in the same plane form continuous membranes, but, as the layers over these have their fibres running in opposite directions, a kind of net-work is produced. These fibres have in general a granular appearance, and at the torn ends fibres of cellular substance may be seen connected with the granular fibres. The muscular coats of vessels rarely present this granular appearance, but resemble the contractile tissue above alluded to so much, that Valentin thinks they ought rather to be placed under that head than under the muscular tissue.

The author places the muscle of the heart and œsophageal muscles near their ventricular end under a separate head, as standing in a certain relation to the animal as well as the organic system. The red muscles of the heart are described as consisting of fine transversely streaked, and often waved primary fasciculi, from the 100th to the 80th of a line in diameter, which divide again and again like the prongs of a fork, and combine in the manner of a net. The muscular fasciculi of the œsophagus are also transversely streaked. In the immediate vicinity of the stomach, however, the transverse striæ are stated to diminish in distinctness, and then finally disappear, at the same time losing their colour. The primary fasciculi are then seen less widely separated, and appear to consist of granules from the 400th to the 300th of a line in diameter, united into difficultly separable granular fibres.

The voluntary muscles are stated to be composed of firmer and finer fasciculi, the older and better bred the animal is. The finest or elementary part of the voluntary muscle consists of a delicate granular fibre or fibril, the granules of which are from the 700th to the 400th of a line in diameter. From fifteen to twenty of these primary muscular fibres united parallel to each other, composed primary muscular fasciculi. The granules of the primitive fibre in the relaxed muscle are stated to have an elliptical form, but become flattened on their contingent surfaces during contraction. An amorphous hyaline substance is stated often to exist in the middle of the primary muscular fasciculus, surrounded by the primary fibres. Broad transverse striæ are often seen on longitudinally streaked primary fasciculi, by which they appear to be sinuously bent, and the muscles of the living frog, when in action, are actually thrown into ziz-zag bendings. From several circumstances which he states, he draws the conclusion that each primary fasciculus is enveloped in a transversely streaked sheath, and he mentions, that in the dog the fibres of this sheath actually run spirally round the primary bundles. He suspects the sheath consists of granular fibres, which may by possibility be separated in two directions, according as the union of the granules is more intimate in the one direction than the other. He has seen convoluted fibres within the muscles of the horse, the uses of which he is ignorant of.

Regarding the evolution of muscle, it is stated that they consist at first of nucleoli and cytoblasts, which form a finely granular substance. From this arise transparent embryonic cells, which arrange themselves as fibres, the somewhat flattened cells coming together in the same way as the blood discs do when they form piles. A single column of cells of this kind forms a primary fasciculus. The septa between the cells shortly after this disappear, the nucleolus disappears or becomes confounded with the granules formed within the fasciculus. With the evolution of these granules, the transversely striated appearance is produced. Delicate cellular fibres arise between the primary fasciculi in small numbers, and between the secondary fasciculi in greater numbers, but it is yet unknown what substance unites the primary bundles or the primary fibres. He has not been able to determine whether at the point of junction between tendon and muscle there be a transition of the primary muscular fibre into the tendinous fibre, or merely an intimate union of the two.

Several other circumstances are mentioned regarding muscles, such as their mode of contraction, being thrown into ziz-zags, the angle of bend being the point at which the nerves cross, their chemical constitution, their sensibility and contractility, and their division into long, short, broad, and orbicular or annular muscles.

The tubular or hollow filamentous tissues, the author regards as "probably products or self-organized interstitial substances of the primary cells; in other words, inter-cellular net-works of hollow-elastic tissue." He regards the primary muscular fibres as the transition structure between the true tubular structures and the solid fibres, and states that the peripheral layer of the primary muscular fibre is to be viewed as a continuous tubular membrane, the inner portions of the same fibre as "an organized soft included matter." This leads directly to the structure of the nerve, its contents being of a tenacious consistence immediately on death at least.

Relative to the Nervous System, the author states that he regards the gray matter of the brain as the inherently active matter; in fact, as the peripheral ganglionic substance; and the white as the tubular or conducting substance which is contained in the nerves, and distributes sensation and motion to every part of the body.

After mentioning the division of the nervous system into the cerebro-spinal and ganglionic, and detailing the characters of each, he describes minutely the microscopic appearance of the nerves. These consist of fine hollow tubes, filled with a matter which coagulates on death, separating into a granular and a fluid portion. The fine elementary tubes are connected to each other by an amorphous matter, or by a more highly developed cellular substance, and form the filaments or cords, which, involved in denser sheaths, constitute the nerves as usually seen. He states he has been able to discover that each fine tube is lined with a fine ciliary epithelium, the cilia of which lie obliquely, and apparently in spiral lines. After death, from the coagulation of the contents, the tubes assume a moniliform aspect; but he says, that this would seem to be their natural condition at their origin in the brain and spinal marrow. In the brain he thinks the roots of the nerves may form loops, and it is stated, " that there they are surrounded by the finest albuminous granules of the cineritious substance, which, indeed, in some parts seem to adhere to them like berries on a stalk." The mode in which the nerves leave the brain and spinal marrow, the coverings they receive from the *dura* and *pia mater*, the piercing of the *dura mater* in single fasciculi, the mode in which the ganglion is formed on the posterior roots of the nerve, the subsequent union of the filaments proceeding from that ganglion with those of the anterior root, are all minutely described. It is only important to note, that the nerves of sensation are not found to differ in the slightest degree in their structure from those of the nerves of voluntary motion. The nerves arrived at the organs to which they are to be distributed, form loops of net-work, alternately giving and receiving tubes and bundles from different branches. They never, however, anastomose; the ultimate tubes merely form loops or circles; they never end; they either join some neighbouring fibre or fasciculus, or return upon themselves to proceed to the central system again. After stating that five different forms of plexuses or reticular unions of nerves exist, and giving instances of each, the author describes minutely the mode in which the peripheral terminations or expansions of nerves are formed, showing that the nervous sensitive papillæ are composed " of a single greatly convoluted nervous fibre." The various modes in which these fibres are convoluted are also minutely described.

Of the ganglionic nerves, he remarks, that, unlike the others, they are always in close alliance with the trunks and branches of blood-vessels, and have hence been termed nerves of the vascular system. As he has observed that persistent cellular fibres surround the oftentimes scantily distributed nervous tubes in these nerves, he thinks these fibres may " serve as subordinate means of conducting the nervous influence." It is also stated that the nuclei of these cellular fibres are granular, and that when the tubes of the nerve form their terminal plexuses, the cellular fibres may be seen forming a net work between them. The expansion of the optic nerve is stated to differ in structure from other nervous terminations, in as much as it expands in the form of a hollow sphere, which consists of two layers, viz., a granulated fibrous reticulated layer, and a layer of dispersed granules. The olfactory nerve also differs from other nerves in consisting of a flat extremely delicate and finely meshed terminal plexus without any apparent final loopings of primary fibres.

In the gray nervous matter, what are called ganglionic globules are met with. These are large granular cells enclosing granular eccentric nuclei and nucleoli. These are found mixed with albuminous granules, gray organic or naked fibres, the nascent roots of nerves, and blood-vessels. These bodies vary in form and size, being from two to five times larger than the blood discs. They are immediately surrounded and connected by a tissue of organic fibres, and in the ganglia they are included between the meshes of the interlaced fibres of the white and gray nerves. These ganglionic globules are stated to occur in three situations, the gray matter of the brain and spinal cord, the point of union between the nerve of motion and that of sensation, and in the ganglia.

The nerves are stated to be developed "essentially in the same manner as the round filaments and primary bundles of muscles. The embryonic cell-substance arranges itself into cell fibres, and from the very finely granulated intercellular filaments, which are not yet white, but of a reddish gray and transparent, like Remak's organic fibres, arise the primary fibres of the nerves." The delicate outer covering remains some time pulpy, and is to be regarded as the intercellular hyaline matter, or cysto-blastema, in which the cellular cysto-blasts and cellular filaments arise, which connect the nervous fibres together.

Of the chemical analysis of nervous matter, Berzelius's analysis of cerebral matter is alone given, no notice being taken of the later analyses.

The Vessels of the body the author classes under three heads, absorbent vessels, as lymphatics and lacteals, blood-vessels, and secreting and excreting vessels. It is stated that, generally speaking, blood-vessels form net-works in the periphery, lymphatics form convolutions in their course called lymph glands, whilst secreting and excreting vessels present no such appearances. That the "blood and lymphatic vessels are lined in their interior with the same serous membrane, a simple, and in the embryo tessellated epethelium," whilst the secreting and excreting vessels are "either inversions of the corion or mucous membranes, or of their epidermis or epithelium."

From his observations the author deduces that the lacteals originate not in open mouths, but in closed nucleated vesicles, and that the chyle is in reality a secretion. From his description it would appear that the nuclei of the pyriform cylinder-epithelium, which covers the villi of the intestines, present themselves in the guise of hollow pediculated vesicles, the cavities of which appear to communicate with larger lymph vessels, which not unfrequently hang together and inosculate in the manner of the meshes of a thick net. It is from these net-works the finest lacteals proceed.

The afferent lacteals, as seen in the mesentery, he states to consist of three coats, the serous or inner tunic, the middle tunic consisting of spirally disposed reddish coloured fibres, similar to the contractile or muscular tissue, and an outer cellular coat. The numerous valves on their vessels give them a knotted appearance, and these valves are described as consisting of semilunar duplica tions of the inner membrane having contractile fibres in their interior. The mesenteric glands consisting of convoluted or plexiform masses of lacteals, blood-vessels, and nerves, connected by means of cellular substance, seem to favour assimilation, by bringing the chyle more immediately under the influence of the organic nerves, and in intimate contact with a large amount of living organic surface. It seems unnecessary to follow the author in his minute subdivision and description of the various forms of the lymphatic glands, or ganglia, interglandular lacteals, or even central chyliferous vessels. Even on the lymphatic vessels and glands it seems unnecessary to enlarge, as the author states, that they are in all respects identical in appearance, structure, &c. with the lacteals and mesenteric glands. Regarding the origin and development of these organs, he states that little or nothing is known.

The sanguiferous system of vessels is next described. After a short statement of the uses of the circulation, the distribution of the vessels, the connections between the arteries and veins by means of the capillaries, the net-works and festoons which these form, &c., the author states that arteries are provided with three layers or coats. 1. An internal serous coat, covered with a simple epithelium, which frequently passes into a cellulo-fibrous epithelium, constituting the sole walls of the capillaries. 2. A middle thick tunic of elastic substance, which surrounds the vessel in several layers, and gives elasticity and strength to the vessel; and 3. A cellular external tunic, which also serves to connect the vessel with the neighbouring parts. It is remarked, that the simple and compound festooned or looped vascular arrangements are always the more remarkable, the more sensitive and active the parts are, and that in their general distribution they bear a close analogy with the corresponding terminal plexuses and meshes of nerves.

The nervous capillaries are stated to be capable of being distinguished from the arterial, even at their very origin, by their larger diameter, so that wherever the arterial and venous net-works form distinct strata, the one is readily distinguished from the other. The veins are, besides, more numerous, and not so regularly cylindrical, and this not from the presence of valves, but from being of actually different diameters in different parts of their course. Some veins are stated even to have normal dilatations or varices, which, under the influence of pressure from the neighbouring muscles, assist the circulation in the same way as the lymphatic heart of reptiles. The venous tissue consists of three coats, but the middle one differs from the artery, in not being composed of elastic tissue, but of fibres of muscular or contractile tissue, twisted spirally. The different modes in which the valves are formed in the veins by duplications of the inner coat by the smaller vessel projecting within the larger, or by a fold of membrane lying over the oblique entrance of the smaller into the larger vessel, are also minutely described.

A separate section is devoted to the consideration of the erectile vessels and organs. Attention is directed to the fact of the peculiar contractile tissue being present in all erectile organs. The peculiar form of the arteries observed in these organs, and of the veins, the one appearing as helicine or tendril-like spirals, or the retia mirabilia, the other, short-knotted vessels freely anastomosing, or as tortuous interlaced vessels forming a vascular net-work, are minutely described.

The author shows that erection is accomplished in the erectile organs, not simply by a more rapid distension of blood-vessels, but by the agency of the nervous system causing a tonic contraction or spasm of the contractile tissue, which exists in all these organs, and which prevents the free escape of the blood.

A short digression is here made to account for the formation of tuberculous matter, and two theoretical opinions are started, upon which the whole reasoning is founded. The first is, that a partial coagulation of the fluid occurs from some cause; the other, that the capillaries, from pressure or other circumstances, are diminished in size. When either of these occur, he states that the circulating fluid will be stopped; in the one case from the blood globules not being able to pass through the contracted capillary; in the other from the coagula filling up the capillary. The consequence of this, he asserts, will be, that the *liquor sanguinis* escapes into the neighbouring tissues, where it coagulates; and when the neighbouring vessels have removed the serum, fibrinous or tubercular matter is found remaining. He divides tubercles, therefore, into three classes,—albuminous tubercles, fibrinous tubercles, and those of a mixed nature. The albuminous tubercle is described as consisting of an unorganized mass of granules, which vary in size from the 1000th to the 200th of a line in diameter, but mingled with nuclei, nucleoli, and cells. The fibrinous tubercle he subdivides into five heads, according to the state of development which the effused matter has acquired; thus he has the hyaline tubercle, where no structure is very apparent, the cytoblast tubercle, the cell tubercle, the cellulo-fibrous tubercle, and the filamentous or organized tubercle.

Regarding the mode in which blood-vessels are developed, much appears to rest on pure conjecture. Mr Gerber, indeed, seems to speak on the subject more from the statements of others than from his own observation, since he quotes Schwann's descriptions of their mode of origin. Schwann states that certain special cells are produced, which are first arranged into cellular fibres and then become fused together to form hollow tubes; but Mr Gerber says in a note, that "blood-vessels only arise between or among cells;"

and in another place, "the vessels themselves, in all probability, arise out of the newly formed intercellular substance." The author relates his observations on the ossification of cartilage in proof of the correctness of his statements, and as an abstract of these was given above, it is unnecessary to repeat them here.

The secreting vessels, which the author shows to be branched sacculated involutions of the mucous membrane or its epithelium, or similar involutions of the corion or its epidermis, terminate in blind pediculated vesicles, into which the peculiar secretion distils or percolates from the blood circulating in the neighbouring organs.

Various other subjects are touched on in this work, on which our space will not permit us to enlarge, such as the evolution of mucous cavities from the mucous lamina of the embryo; general remarks on the structure of the skin and mucous membranes, and the division of glands.

The work contains a good and condensed view of the modern theories regarding the origin, formation, and minute structure of the animal tissues and fluids, and is well worthy of a most careful perusal. It contains, indeed, such an amount of matter, that our greatest difficulty has been to give anything like a condensed view of its contents. Many interesting and instructive notes are added by the able translator, to whose appendix we now turn, as containing much additional and valuable information on points to which he has more especially devoted his attention.

Mr Gulliver's first paper is entitled Observations on the Blood Corpuscles of Mammiferous Animals. From the table which he gives at the end of his paper, it would appear that he has measured the size of the blood corpuscles in no fewer than 175 mammalia, so that his remarks on this point are of extreme value. He remarks that the corpuscles vary in size in the same species at the same age; that it is not uncommon to see the majority of the discs of two distinct sizes, one about half or two-thirds larger than the others. The larger only seem to be the regular corpuscles, and run into the characteristic piles, which the others do not. The small corpuscles scarcely ever present the swollen edge or the cup-shaped appearance of the larger ones. The discs also often shrink or become puckered after extravasation.

It is stated that, though it be a general rule in the mammalia, that the blood corpuscles of the embryo are larger than those of the adult, this is not always the case, as he has seen them at a later stage of utero-gestation smaller than those of the mother, and also of the same size.

His tables show that there is no relation between the size of the animal and that of the blood corpuscle, but he thinks that there is a kind of relation of this kind in the species of the same family, and that the measurement in his tables bear him out, generally speaking. They do not, however, appear to us susceptible of such a generalization. Thus the domestic cat, Norway lynx, and serval, have larger blood globules than the larger species of the same genus, the puma and ocelot. The ass, the dshikketai, and Burchell's zebra, have larger blood globules than the larger species; the horse; the axis, and fallow deer have them larger than the roebuck; the common and Brahmin cow have them larger than the Cape buffalo; the common mouse larger than the common rat, &c. Mr Gulliver justly remarks, that there seems to be no necessary connection between the size of the corpuscle and the kind of food on which the animal feeds.

Mr Gulliver then goes over in detail the various classes of mammalia, individually pointing out the peculiarities of the blood discs of each. He found the elephant to possess the largest blood discs, and the Napu-musk deer the smallest of all the mammalia.

The blood corpuscles are described as being generally flat circular discs with rounded edges, the thickness being about equal to a fourth of the breadth. In general the discs are flat, sometimes depressed in the centre, at other times tumid, and occasionally cup-shaped. Two or three central particles are occasionally visible in the centre. In the camelidæ the discs are oval. Oblong, pear-shaped, polygonal and sigmoid forms are often assumed by blood discs, and granulated or mammillated discs may be seen in the blood at all times. These Mr Gulliver found always present in the blood of puppies and kittens. They are rather smaller than the common discs, irregular in shape, slightly flattened or nearly globular, with attached granules or molecules estimated at from the 80,000th to the 10,000th of an inch in diameter. Angular particles abound in blood, and granules could often be detected projecting from their angles. In the young embryo the corpuscles were found lenticular or spherical in form. The fact of the corpuscles being seen to alter their forms under the microscope is noticed.

Mr Gulliver says the colouring matter may be removed from the blood corpuscles by washing them with water, when the central spot disappears. He therefore attributes that appearance to the colouring matter being accumulated chiefly at the circumference. When the colouring matter was removed the jagged appearance of the corpuscle was not noticed; he therefore thinks that appearance was produced merely by a division of the colouring matter. He has never been able to satisfy himself of the presence of a nucleus in the blood corpuscle of the mammalia, but in the lower vertebrate animals the nucleus was distinctly visible.

Besides blood corpuscles, Mr Gulliver states that white globules occur, to which M. Mandl has given the name fibrinous globules. These globules have an average diameter of the 2900th of an inch. They are spherical, semitransparent, and granular on their surface, or smooth; acetic acid exhibits two or three nuclei in them. These globules seem of the same size in all animals, and to have no relation to the size of the blood corpuscles. It is stated that it has not been satisfactorily proved what is the nature of these white globules. Mandl regards them as fibrine, Wagner and Muller as lymph. In order to compare these globules with the fibrinous cells and their nuclei, the measurements of a few of the cells and nuclei of fibrine are given. He thinks the lymph globules and white globules of the blood are the same in reptiles, because they may even be seen circulating in the blood, but he doubts if they are the same in the higher animals. Mr Gulliver attributes the presence of these globules in the blood to disease, as they are more numerous during inflammatory and suppurative diseases. From the strong resemblance to the purulent matter corpuscle Mr Gulliver states he elsewhere described them as such.

Spherules of white matter are also described as occurring in the blood of animals who had died of various diseases. He found milky serum to depend on the presence of spherical particles so exceedingly minute that the highest magnifying power was required to distinguish them. These particles were apparently identical with the molecular base of the chyle. He has also met with corpuscles resembling those of the spleen and supra-renal capsules. Nothing satisfactory is stated regarding the use or formation of the blood corpuscles. He mentions, however, that he has seen minute spherules detach themselves from the granulated particle, and project into the serum; but more frequently minute spherules attach themselves to the irregular and jagged corpuscles.

Mr Gulliver's next paper is on the Blood-corpuscles of Birds. He has given, in tables, the long and short diameters of the blood corpuscles of no fewer than 204 birds, from which it appears, that there is much less variation in their size than in those of the mammalia. The short diameter, in general, comes nearly to the diameter of the mammalian blood disc. Their long diameter is less than twice their breadth, and their thickness about a third of their breadth. All are oval, but the form of the oval varies. They are, in general, flat, without either depression or elevation in their centres. Nuclei are visible in every corpuscle. It is stated that if a drop of acetic acid be added to the blood corpuscles of birds, the field of vision is instantly filled with the nuclei.

Mr Gulliver's observations on tubercle are rather in the form of a note to Gerber's statements than a distinct paper. He states that before he saw his work, he had arrived at the same general conclusions.

He states that frequently the nicest examination can detect nothing more than granular matter, minute spherules, and shapeless flakes or fragments. Sometimes the fragments are more distinct, but still unlike cells or nuclei, and the minute spherules are seen attached to them. In smaller tubercles, corpuscles are seen having the character of cells and their nuclei, their envelopes being either absent, or blended with a minutely granular base. But that it is only in minute and recently formed tubercles that perfect cells exist. He thinks it probable, therefore, that tubercular matter originates from cells, but differs essentially from the matter of plastic exudations, as its primitive cells can only retrograde and degenerate, not multiply and evolve organized germs like the lymph.

Chyle and the fluids of the thymus and lymphatic glands form the subject of Mr Gulliver's next paper. The chyle is described as a compound fluid, composed, 1. of extremely minute spherical particles, which constitute the molecular base of the fluid; 2. globules; 3. blood corpuscles; 4. oil globules; 5. minute spherules of unequal size. The minute spherules constituting the molecular base have a diameter between the 36,000th and the 24,000th of an inch, requiring the best instruments to render them visible. The chemical properties of this base are stated to be, that no change is apparently effected on the particles by alkaline or earthy salts, nor by alkalies, nor by acetic, muriatic, citric, or tartaric acids,—the acetic merely clustering the molecules into masses. It is apparently dissolved by ether, but the particles are seen floating in it unchanged. He regards this molecular base, then, of the chyle as a peculiar matter, remarkable as being composed of excessively minute particles, which are soluble in ether, and which remain unchanged by numerous agents which affect the chyle globule. This matter he has often discovered in the blood when it was abstracted during digestion.

The chyle globules are described as minutely granulated spherical bodies of various sizes, seldom exhibiting any nuclei, but sometimes two or three central molecules. Muriatic acid is said to reduce these globules to particles of extreme minuteness. The chyle from the thoracic ducts in coagulating, aggregates together the whole of the chyle globules, so that none remain in the expressed fluid. He mentions it, however, as a remarkable circumstance, that, in the clot, the globules appear of a less regular shape, whilst they are increased in number.

The blood corpuscles of the chyle are stated to be frequently irregularly indented at the edges or granulated, and many have the "little spherules so regularly arranged as to render it probable that the outer coloured part of the blood corpuscle was thus being formed." They were also generally smaller than blood-discs from the heart.

The minute spherules found in the chyle he regards as albuminous. They are not soluble in ether, and are of very various sizes.

When an animal fasts, it is stated that the fluid of the mesenteric glands loses its molecular base, and becomes apparently identical with that of the lymphatic glands, viz. semitransparent, and of a light-brown tint, containing many globules. The thymous fluid, from having these globules very numerous, assumes a creamy and opaque hue. The chemical and microscopic details of the characters of these globules of the thymous and lymphatic fluids are given, by which it appears that they are "probably identical." From observing that the globular particles are especially abundant after the fluid has passed through these glands, he regards the mesenteric, thymus, and lymphatic glands as probably "organs of nutrition, in which the effete matter taken up by the absorbents, and the chyle by the inferent lacteals, may undergo a second digestion or elaboration, so as to be modified and prepared to aid in the growth and preservation of the animal." Several circumstances are mentioned, which would appear to corroborate this view of the subject, such as the wasting of the body when these parts become affected, the impoverishment of these fluids under bad nourishment, and the shrinking of these glands, &c. He thinks these globules are in most respects analogous to the nuclei of primary cells, and that they probably will prove to be so many germs for the formation of those cells which appear to be intimately connected with the development of the animal tissues generally.

The pulp of the supra-renal gland is described as composed of an infinity of minute oil-like spherules, varying in diameter from the 24000th to the 6000th of an inch. It is mentioned that these minute bodies do not appear to be affected by mineral acids, by alkaline, earthy or metallic salts, nor by ether. In many ruminants, it is stated that these minute spherules are less abundant, their place being supplied by corpuscles resembling lymph corpuscles, which are probably cells or nuclei. In the blood from the venous sinus of the supra-renal gland, he has often detected minute spherules which could not be distinguished from those of the gland. He thinks, therefore, the veins may be the excretory ducts of the gland. He has noticed the same spherules abundantly in the pulp of the supra-renal glands of some birds and reptiles.

We cannot close our notice of this work without adverting to the valuable plates by which it is accompanied. Twenty-seven of these are illustrative of the text of Mr Gerber, the remainder, of the notes and appendix of Mr Gulliver; and though it will appear a defect to many that Mr Gerber's drawings exhibit a harshness and distinctness of outline not to be met with in nature, and which Mr Gulliver has perfectly succeeded in avoiding, they do not seem the less worthy of praise, as they appear to be correct representations of the objects he means to represent.

In the present state of General Anatomy, Mr Gulliver has rendered to the profession a great and important service, in introducing with such ability the present work to the English reader. Mr Gerber may regard himself as fortunate in obtaining the assistance of one so competent to do justice to the subject. By the publication of his own researches also, and all their results, Mr Gulliver has provided the student of the anatomy of texture with a large store of new and valuable information; and the present work may be justly recommended as one which will both require and reward attentive perusal.

ART. IV.—1. *The Fifty-fifth Report of the Visiting Justices of the County Lunatic Asylum at Hanwell.* London, 1840, post 8vo, pp. 31 and 93.

2. *The Fifty-ninth Report of the Visiting Justices of the County Lunatic Asylum at Hanwell.* London, 1840, post 8vo, pp. 55 and 69.

3. *Second Annual Report of the Crichton Institution for Lunatics.* Dumfries, 11th November 1841.

4. *Annual Report of the Managers of the Royal Edinburgh Lunatic Asylum for the year* 1841. Edinburgh, 1842.

5. *Twenty-eighth Annual Report of the Directors of the Glasgow Royal Asylum for Lunatics, submitted in terms of their Charter to a General Meeting of Contributors, 6th January* 1842; *with the First Report of the Physician.* Glasgow, 1842, 8vo, pp. 58.

6. *Statistics of the Retreat, near York; consisting of a Report and Tables exhibiting the Experience of that Institution for the Insane, from its establishment in* 1796 *to* 1840. York, 1841. Post 8vo, p. 62.

7. *Report upon the Mortality of Lunatics.* By WILLIAM FARR, F. S. S. (Read before the Statistical Society of London, 15th March 1841.) 8vo, pp. 17.

8. *Observations on the Admission of Medical Pupils to the Wards of Bethlem Hospital for the purpose of studying Mental Diseases.* By JOHN WEBSTER, M.D., &c. 2d edition. London, 1842. 8vo, p. 32.

No department of medical therapeutics has undergone improvements so great and so advantageous, as that which relates to the management of the insane; and in no other, perhaps, is it possible to recognize so clearly the efficacy of a judicious union of correct theoretical and safe practical views. Pathology here, whenever it is allowed to speak, throws a clear and steady light upon therapeutic measures; and the good or evil effects of various methods of treatment, may often be employed in reflecting light on the nature and varieties of mental derangement.

When, indeed, we consider the nature of mental derangement, it appears extraordinary that the improvements in treatment to which we allude, were not sooner proposed and carried into effect; and, that they were so tardy in being adopted, only proves how much we are under the influence of habit, and how difficult it is to divest ourselves of prejudices which have acquired strength and become inveterate, from a sort of intellectual somnolence and judicial supineness. If a man, twenty or twenty-five years ago, was labouring under symptoms of disease of the lungs or heart, he was subjected to appropriate medical treatment; for instance, rest, low diet, antiphlogistic measures where requisite, and the employment of all those agents which were known by experience, or understood upon sound theory, to exercise a sanative influence on the distemper. At the same period, if a man were labouring under symptoms of disease of the brain, instead of having recourse to some sweet oblivious antidote that might raze out the written troubles of that organ, medical treatment was rarely thought of and little practised; but he was confined in a small imperfectly aired and badly lighted den, perhaps with some one or two more fellows in misery, loaded with fetters, chained to an iron bar, or tied in a straitwaistcoat so closely to his bed, that movement was impracticable without pain, and strangulation might have been quite possible. Sometimes even the furious noisy maniac was gagged; and in others he was beaten with many stripes. Of medical treatment, properly so called, there was little or none. The patient, in short, if such could be termed the unfortunate maniac, was left to recover, or to live in madness and idiocy,—or die, as it might be, without effort being made to rectify his erroneous notions, to arrange his thick-coming fancies, or, in short, to cure his distemper.

Fortunate it is for the deranged, and creditable to the age that all this is now changed, and that maniacs are treated as persons with diseased minds. Instead of the barbarous system of bodily restraint and coercion, sometimes flagellation, which was the indication of an uncivilized age, but the appanage of an age in all other respects civilized, means are now taken to treat the deranged upon principles much more rational and humane; and though it is impossible to treat them as sane, yet they are treated as persons whose minds wander, whose faculties are imbecile; as men and women in age, and persons, but as infants and children in mind and intellect.

Though many benevolent and rational individuals were shocked at the system of confinement and coercion to which maniacs were subjected, and could not understand why they were so treated, and proposed numerous schemes for a milder and more humane method, the first person who put it in practice, we believe, was Pinel, the celebrated physician of the Bicetre. He had long been of opinion that the system of chaining the insane to walls or loading them with fetters was most detrimental to their recovery as well as cruel; and so long ago as 1792, he obtained permission from the authorities in Paris to make such changes as to him appeared proper in the management of the inhabitants of that hospital. He tried the experiment of liberation from fetters in two or three cases of violent and furious madness; and, as in consequence of this change the patients became much more manageable, fifty-three insane persons, formerly in chains, were, in the course of a few days, set at liberty; and remarkable improvement was the result.*

The first English institution in which the treatment of the insane without restraint or coercion was attempted, was the Retreat at York; "the officers of which decidedly recognized the principle that it was not, speaking generally, by means of fear and intimidation, but by judicious and persuasive kindness, tempered by firmness, that the insane were most efficiently managed and governed; and consequently, that this was the plan of moral treatment most favourable to recovery. All implements of punishment, chains, and all severe means of coercion were, if not from the very first, very speedily discarded; and in the course of a very short time, a conviction of the inefficiency of the old method, and of the evils connected with it, was established in the mind of the original superintendent, the late George Jepson, under whose administration the superior efficacy of the mild system of treatment, both as respects cure and security, was soon apparent."

This was done from the first without any knowledge at that time of what had been effected in 1792 by Pinel. Indeed, it was in 1792 that the late William Tuke proposed to the Society of Friends at York, the establishment of the Retreat, upon principles widely different from those upon which all existing institutions were conducted. When the Retreat was opened in the summer of 1796, and when it could accommodate not more than thirty persons, this method of management was attempted, and has since been carried to as great an extent as circumstances would allow. Coercion, though admitted to be a necessary evil, was as little as possible resorted to.

A long period elapsed, nevertheless, before the method could find any abettors or defenders; and in this country the present century was well advanced, and yet witnessed no change in the treatment of lunatics. The Lunatic Asylum of Lincoln was, we believe, the first to show the example; and even after the practice had there been in operation for some years, it was viewed with distrust and apprehension, and became, if we are not misinformed, the object of misrepresentation. Differences of opinion arose and gave rise to controversy and some contradiction, in the course of which it was quite clear that early and inveterate prejudices operated with the usual force. Truth and justice, however, at length prevailed; and while several old institutions adhered to the errors of their early years, and served to be living monuments of the fallacy of that aphorism, which says that age teaches experience, most of the new and recent establishments adopted the system of treatment without restraint, or at least with a very small proportion of it.

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* Memoires de l'Academie Royale de Medecine, Tome v. Paris, 1836.

The system was next introduced at Hanwell, under the superintendence of Sir William Ellis, and there carried to considerable extent. It may be remarked that the treatment of the insane embraces not only medical treatment adapted to the removal, or the alleviation of various symptoms of the disorder, but also moral treatment, which comprehends not only the use of all those means which operate on the mind, and tend to break up the morbid associations, but also all those contrivances and occupations which are suited to the insane, and which, by employing corporeal organs, at the same time with the mental faculties, tend to wean the imagination from its own wild fancies, and give the mind a little of that discipline which it has in the sane.

Sir W. Ellis acting on this principle, introduced as part of the treatment occupations and amusements of different descriptions, and by adapting these to the peculiar dispositions or states of patients, he ofttimes succeeded, first, in calming the mental tempest by which some minds are agitated, and then in enfeebling, and finally destroying those trains of thoughts and illusions which tend so much to maintain the derangement of many persons.

All means of restraint, nevertheless, were not altogether banished from use at Hanwell; and it was only in 1839, some time after the accession of Dr Conolly, the present resident physician, that this bold experiment was put in full and extensive operation. The effects of this experiment, which was witnessed for some time with great interest and much solicitude, by physicians of all modes of thinking, may now be said to be well ascertained; for though little importance could be attached to its continuance for a few months, or one year, certainly, when it has been in operation for three years, it must be allowed that its advantages and its disadvantages ought to be established in a manner sufficiently clear and unequivocal. It is important to the history of the treatment of insanity, and must be interesting to our readers, to learn the authentic facts of this experiment; and we, therefore, record it in our pages in the language of Dr Conolly himself.

"The use of the strait-waistcoat, the muff, the restraint-chair, and of every kind of strap and chain designed to restrain muscular motion, was discontinued on the 21st of September 1839, and has never been resumed. The practice of fastening the epileptics, exceeding 100 in number, by one hand to their bedsteads at night, was gradually put an end to about the same period. After the liberation of some from this nightly restraint, the keepers and nurses, apparently satisfied with the results, discontinued the practice by degrees; and no inconveniences have followed, calculated to justify a return to it. In the intervals of their malady, some of the male epileptics are so reasonable as to be among the most industrious and best behaved patients in the asylum. This observation applies, although not to the same extent, to the female epileptics also; several of whom are young, and, except at the epileptic periods, mild and inoffensive in their manners. It was painful to behold sensible and well-behaved men, and harmless and delicate girls, not allowed to have the common privilege of rest at night, without one hand being strapped to the side of the bed, so as to prevent their lying with comfort either on the right side or on the left. The reasons assigned for this practice appeared to the resident physician to be perfectly unsatisfactory: and the practice itself rather dangerous than protective. Some epileptics spring out of bed during the fit; and for these very low beds are used; and sometimes a second mattress is placed by the side of the bed on the floor. During the day, notwithstanding the most watchful attendance, epileptics are liable to injury from falls, especially those who invariably fall on the face. But alert attendants very much limit these accidents.

"The management of the patients without bodily restraint has been applied to 1008 lunatics; and has been acted upon for more than twelve months; and it has thus far been found practicable to control every variety of case, without any fatal accident or serious outrage having occurred. For a time after perfect freedom of action was giving to every patient in the asylum, some of those who were not accustomed to this indulgence, abused it by breaking unprotected windows, and by tearing clothes and bedding: but this destruction, which is known to be very great in asylums where restraint is much resorted to, has been much limited by contrivances which baffle the patient, without producing irritation. Even the stuffed gloves mentioned in the physician's last Report as resorted to in some cases, in which the patients were accustomed to strike others, were found to possess so many of the disadvantages of restraint, that they were discontinued after a short trial. They were chiefly employed on the female side of the house; and the report of the nurses concerning the patients to whom they were applied, as well as those who for the same reason perpetually wore leg-locks, is, that they are less combative and dangerous than they were before.

"Any contrivance which diminishes the necessity for vigilance, proves hurtful to the discipline of an asylum. Physical restraints, as they rendered all vigilance nearly superfluous, caused it to fall nearly into disuse; and, in proportion to the reliance placed upon them, innumerable evils of neglect crept in, which cannot exist where restraint is not permitted."—Pp. 44, 46.

It has always appeared to us that the insane mind, however perverted in all its manifestations, is nevertheless best and most judiciously managed on the same principles, and in the same manner as the sane mind; and that the same behaviour which produces good feelings with men and women of sound minds, in society generally, must be also, generally speaking, productive of the same effects as those with deranged minds. We are happy to see that Dr Conolly takes the same view, and acts on it in the management of the insane.

"Among the obstacles to the acquisition of this entire confidence, none is found practically to be so great as any previous manifestation of anger, or even of irritability. The imposition of severe and immediate restraints, resorted to with such feelings, and answering a mere temporary purpose in a coarse, mechanical manner, has a tendency to render all the higher parts of treatment forgotten in most cases, and in others difficult and impracticable. Lunatics, however audacious in aspect, are generally the prey of fears and suspicions; are prone to mistake the meaning of simple and ordinary actions; and are easily agitated and alarmed. They are only assured and rendered attached by a continual course of kind and encouraging conduct; in which even their keen and distrustful observation can detect no real or apparent unfriendliness, and no approach to deception. It can scarcely be necessary to remark, that any kind of cruelty is totally incompatible with such conduct on the part of those who undertake the treatment of lunatics; and even that severity, however occasional it may be, is fatal to its integrity. The reliance of the patient must be entire in order to be salutary. Whatever leads the patient to think himself deceived, encourages him to deceive; and there is no further dependence to be placed upon him.

"Misled by the lingering prejudices of great authorities, the resident physician for a time believed that cases in which it was judicious to assume a tone of severe displeasure and command, and to enforce obedience which persuasion had failed to effect, were of frequent occurrence. On reviewing instances of this kind calmly, he has always become convinced that patience, a little longer continued, would have been preferable. He has generally found the confidence of the patients for a time much shaken by violent attempts to control them; and it has sometimes only been regained after many weeks. Since the abandonment of the authoritative manner, except in very peculiar cases, (in which it requires to be employed with the utmost composure and appearance of solicitude,) he has repeatedly found that violent patients may be persuaded to go into their rooms and be quiet, although half-a-dozen attendants would find it difficult to force them into such salutary seclusion. The success is greatest with those who have never been subjected to bodily restraints. In old mismanaged cases, the temper is rendered more irritable; and the mind more suspicious. Yet even in these inveterate examples, in which patients, long after coming to the Asylum, have always appeared on the borders of frenzy, to which a word would drive them, the advantages of long continued gentle treatment have been at length plainly discernible. Each successive attendant upon such patients has assured the physician that no other kind of treatment has had any good effect upon them. The physician speaks from repeated observation, when he says, that no favourable impression could be made upon these patients, so long as restraints were either resorted to or threatened. Yet in these patients the mere mention of restraint was often observed to cause the patient's face to become deadly pale: an evidence of its efficacy as a punishment; standing quite apart from any proof of its efficacy as a means of moral control. The spectacle, in these cases, when the strait-waistcoat was determined upon, was most distressing. There was a violent strugle: the patient was overcome by main force; the limbs were secured by the attendants, with a tightness proportioned to the difficulty they had encountered; and the patient was left, heated, irritated, mortified, and probably bruised and hurt, without one consoling word; left to scream, to shout, to execrate, and apparently to exhaust the whole soul in bitter and hateful expressions, and in curses too horrible for human ears.

"It was impossible to view these things, almost daily occurring, without resolving to endeavour to prevent them. Occasionally, peace was restored by the sudden and unexpected removal of the restraints; and at other times, restraints were allowed to remain on until the patient became quiet, or sullen. In the first case, good was sometimes done; in the second, none ever resulted. By degrees it was found that by refraining from restraint, although it was still alluded to, the patient felt that an obligation had been conferred; and would promise good behaviour, and, for a short time, maintain it. But it was not until restraints had for many months ceased to be seen in the wards, that tranquil conduct of any duration was observed in these patients. Some of them have now proved capable of removal to the quieter parts of the asylum; after having been long considered the most hopeless patients in the house. Their malady is incurable; but it appears to have lost some aggravations resulting from years of mismanagement: for some of these patients are now middle-aged; became insane in the prime of life; and were sent here after being in many lunatic asylums."—Pp. 47—49.

It was not to be expected that an innovation so extensive and so complete was to be carried into effect without much opposition, some misrepresentation, and as much calumny as could be attempted upon the ordinary pretext of public good; and in accordance with this customary result of improvement, which departs a little from usual methods, very serious evils were ascribed to the system of non-coercion, and whatever unfavourable accidents took place, were, with little scruple, set down to the disuse of the former means of restraint. This gave rise, of course, to investigation, which terminated, fortunately for the cause of humanity, in confirmation of the correctness of the system introduced in 1839. Hear the report of the visiting justices upon this formidable and important subject.

"At the Michaelmas Quarter Sessions of the last year, a question arose, as to whether the system which had been adopted by the Resident Physician of the Asylum at Hanwell, and had been sanctioned by the visiting justices, had not been carried out in too rash and unqualified a manner to be practically safe. Such were the conflicting opinions entertained upon this question by intelligent men, that it was then resolved, by the magistrates assembled, to entrust the control of the asylum to the same visiting justices for another year, and to postpone any decision upon the subject, if a decision might be necessary, until the court could have the benefit of the longer experience and the more matured judgment of its committee. It was impossible to doubt the propriety of the course which was then resolved upon, and the visiting justices felt it to be their duty to enter once more upon the trust which was confided to them, of watching, with calm and unprejudiced minds, the practical working of the system; prepared, on the one hand, to give it their steady support, should the further examination of the facts which might come under their notice bear out their favourable opinions, or, on the other hand, so to modify it, as to remove the reasonable objections of those who deemed it to be both theoretical and dangerous. But no sooner had the committee recommenced their labours when they found themselves publicly called upon to enquire into the existence of a multitude of alleged abuses, which were said to be peculiarly referrible to the system of non-restraint as carried on in the asylum. The court, however, after listening to the prolonged discussions which arose out of these charges, saw no good grounds for reversing their previous decision, but postponed the further consideration of the question until they should be in possession of the report which the visiting justices have now the honour to lay before them.

"The points upon which the visiting justices have specially to report are, whether, in the management of the patients at Hanwell, the mechanical means heretofore employed in restraining violence, or in preventing accidents, can be altogether dispensed with without great danger to the insane or to their attendants; and whether there may not be more of actual cruelty hidden under the show of humanity in the system of non-coercion, than was openly displayed in muffs, straitwaistcoats, leg-locks, and coercion-chairs. Both of these are very serious and important questions to answer, the one involving the personal safety of the patients, and the other their personal comfort, which all along the Committee had been studiously endeavouring to promote.

"It is quite clear that, had the choice been between constant personal restraint as a preventive against accidents or dangerous violence, and no restraint at all, the question might easily be answered. It belongs especially to the malady with which the insane are afflicted, that they are uncertain and capricious in their actions; that they are liable, with little or no apparent cause, to paroxysms of fury, that there are strong suicidal tendencies to be found among them, and in the cases of the idiotic and the epileptic, that their very helplessness is frequently a source of danger. Against these it is impossible at all times to guard so effectually as to afford absolute and perfect security, except it be by the application of the most rigorous mechanical restraint, and that without intermission. Every relaxation of this mode of management, must, from the very uncertain nature of the disease, be attended with some degree of danger. This is inevitable, and if every other consideration of a far higher nature must be sacrificed to perfect security from all danger, such selfish views can only be realised by reverting to the practice of past times, and of a barbarous people, when the insane were chained and beaten as if they were wild animals, who had nothing of humanity remaining but the outward form; and when the idiotic, from whom nothing was to be feared, were left to roam at large uncared for, and unprotected. But the question is the comparative security of two plans, both of them necessarily imperfect; the one, imperfect from the occasional intermission of mechanical coercion, at times possibly when it might be most required, and the other, from depending chiefly upon moral means for security, and not at all upon instrumental restraints. That the former plan offers but a very imperfect safeguard against dangers of every kind, is put beyond a doubt, by the instances of suicide, and attempts at suicide, of violence, attended with fatal, or serious consequences, and of accidents, which are to be found in the records of every institution, including from its commencement those of the asylum at Hanwell.

"But do the means which are now adopted at Hanwell offer an equal security against the dangers to which every institution, and especially every large institution for the insane is liable? Are they sufficient to guard, not with absolute certainty, but with reasonable hope against danger, equal at least to the mode of management for which it has been substituted? The visiting justices beg to answer distinctly in the affirmative; and to state, as the result of their experience, that, notwithstanding the many obstacles, with which the non-restraint system has had to struggle, notwithstanding the difficulties which have unavoidably attended the transition from one system to another, notwithstanding all these, and even more than these obstacles by which the means have been materially weakened that were relied on for complete success, that success has fully equalled their hopes, and has presented advantages, which in their opinion more than compensate the imperfections to which every human contrivance is liable.

"The court will see at once the nature of the difficulties attendant upon the change, by adverting to the means which are relied on for carrying out the plan successfully.

"It requires especially constant watchfulness, and the kindest treatment of the patients, and forbearance on the part of the keepers and nurses under circumstances, however irritating. But those keepers and nurses had many of them been long accustomed to consider it a part of their duty to resort to instruments of coercion whenever in their judgment, or, in the absence of judgment, whenever to save themselves trouble, they might think them to be necessary. Habits such as these naturally indisposed to the watchfulness which was required of them, and induced them to depend upon a severity of manner, and sometimes of conduct also, rather than upon the gentler and not less effectual influence of kindness and forbearance."—Pp. 12–15.

It appears from other passages in the same report, that the system has had to struggle with very great difficulties and impediments, proceeding from quarters where it ought to have met nothing but facilities.

"But the vigilance, kindness, and forbearance of the keepers and nurses; the usual employment of the patients; the constant endeavour to contribute to their comfort by cheerful and harmless amusements, could not at all times be ensured, unless by the willing cooperation of the officers in carrying out the system themselves, and in steadily enforcing on the attendants the performance of their respective duties. Here the system of non-restraint has had much to struggle against. Unfortunately the resident physician has not at all times received, on the part of every officer, that willing support which was due to him and his great exertions; and had it not been counterbalanced by the zeal and talents displayed by other officers, there is every reason to think that the system must have been borne down and crushed by the many untoward circumstances which culpable negligence would have served to produce. But, happily, a better state of things has arisen; the chaplain, on the judicious exercise of whose ministry so much that is most valuable depends; the matron, the two house surgeons, are all, it appears to the committee, uniting, as they ought, with Dr Conolly, in allowing this system the free and full exercise of the means which are necessary for its success.

"But where, as in the case of the violent lunatic, the above-mentioned means would not be found sufficient to guard against a paroxysm of fury, then, as a last resort, and, as it has proved, an effectual one, the patient is placed, with the least possible violence, in seclusion. In some instances, it is true, the shower-bath may be required as a medical remedy; but seclusion in a room, in ordinary cases, has been found, and usually in a short time, to produce the desired effect. Here, the sources of irritation, whether fancied or real, are removed from sight; the patient has no painful instrument of restraint to torment him; and thus left to himself, without the means of injury within his reach, he soon recovers his usual temper and condition of mind.

"In addition to these safeguards, carefully padded-rooms have been provided for such of the epileptic as are liable to injury from falls; low bedsteads, and beds covering the rooms, for those patients who were formerly kept strapped, to prevent their rolling out of their beds, peculiarly-constructed dresses for those who would otherwise destroy them. These, and other minor contrivances, are designed to meet the various exigencies as they arise, and to ensure, so far as human contrivances can ensure, the safety of the patients by other means than those which at once torture the body and exasperate the mind.

"And yet it has been supposed that there is actually more of cruelty in this system, under the guise of humanity, than in that which was partly carried on by instruments of coercion! To this the visiting justices would beg in reply to say, that they can detect no grounds for so serious an imputation. If it had altogether failed, and by its failure entailed unnecessary sufferings upon the patient, then, indeed, it might possibly be open to such a charge. But such is not the case. It has not failed, but has succeeded; and the visiting justices have perhaps one of the best proofs of its success in the testimonies of the patients themselves, when they are restored to health, and are fully alive to the comforts and advantages which they have enjoyed under it. The committee are accustomed, on their appearing before them, to receive their discharge, to examine them as to the degree of consciousness they possessed during their malady, and it has been found that their consciousness, and their recollection of what had passed, were much more distinct and perfect than might be supposed. In answer to enquiries as to whether they were satisfied with their treatment, and whether they had any thing to complain of, they have uniformly, with but one exception, where a female complained of having been once struck on the face by a nurse, expressed themselves perfectly satisfied with the kindness and attention they had received, and, in some instances, in such feeling terms, as to convince the visiting justices that kind treatment is not lost upon the insane, but is distinctly and gratefully recollected when they are restored to reason."—Pp. 20–22.

Such is the language of the visiting justices after a trial of this method carried on in the most careful manner, and with the greatest attention to all necessary precautions; and it may be safely said, that the result is most satisfactory, and the evidence in favour of the non-coercion system quite conclusive. It was, indeed, in some respects, fortunate that the system did at first become the object of misrepresentation, for this only led to its being subjected to more thorough and impartial investigation, and the conclusion, that, however impracticable and visionary it might appear to the supporters and advocates of the coercive method, it was, in all respects, more efficacious in the end, and attained the great object of the directors more effectively and more easily.

In his last report, the resident physician gives the following interesting account of its effects:

"More than two years have now been completed since the resident physician began to report to the visiting justices the gradual disuse of mechanical modes of restraint, and the substitution of a more efficient superintendence by means of a greater number of attendants of intelligence and respectability; his motives, as then stated, were the apparent inefficacy of mechanical restraint as a means of preventing accidents and mischief; its irritating effects on the violent; the alarm it occasioned to the timid, and its tendency to debase those to whom it was applied, and to create incurable habits of uncleanliness. The resident physician gratefully remembers the consideration these representations received from the visiting justices in the autumn of 1839; and the kindness and constancy with which his early efforts to abolish a mode of treatment so objectionable were regarded by them, in the midst of difficulties which he is now happy to be able to refer to as entirely overcome.

"In October 1840, after a year's experience, made in circumstances, some of which were singularly unfavourable to the success of the trial, he felt himself justified in announcing its probable success. Another year has now passed; and the experiment has for a part of this year been conducted by a united household. From the moment of this union of purpose among the officers and attendants, the obstacles besetting the experiment have diminished; accidents and assaults have become less frequent,—and the general tranquil lity and order of the asylum have increased. However unpleasant the recollection of the state of the asylum may be at the time of the commencement of the change of system, it affords the important knowledge that confusion among the patients is the concomitant of unfaithfulness in those on whose exertions the superintendent must depend, and the preservation of discipline easy when those whose office it is to preserve it are zealous and sincere.

"Every successive month appears to add to these encouraging effects; the attendants daily acquiring a clearer appreciation of a system from which violence of every kind is excluded. Its advantages are thus more effectually secured to patients newly admitted; and the general results strengthen the conviction that by abolishing restraints many other evils, considered inseparable from lunatic asylums, are at the same time swept away.

"In the course of the year several patients have been admitted in restraints, and many more marked with restraints imposed before admission. The management of all these cases has proved perfectly practicable without restraints. In general the patients have seemed very sensible of the benefits of their emancipation; and in some instances in which patients so marked,—marked indeed for life,—have recovered, they have delivered a consistent and impressive relation of their former treatment, and expressed their belief that it was extremely injurious to them. In one case, that of a fine young man, of excellent temper, (J. E.) both ancles and both wrists were ulcerated, and he informed us that this was done by handcuffs and leg-locks, worn before admission; and the whole body so emaciated that he seemed to be sinking fast into the grave. For a short time this patient was occasionally troublesome, and he was now and then secluded: but he gradually became quiet in his behaviour; he grew stout, was employed in the store-room; and in four months went away quite well, and with the good wishes of all who knew him. This young man repeatedly said that he owed his life to his removal to Hanwell."—Pp. 25-27.

Several other cases, for which we cannot make room, equally pointed, and equally satisfactory, are detailed.

It was judicious in Dr Conolly to refrain from interfering in the controversial war that was waged on this subject for a considerable time. It is clear, from all experience, that such controversies rarely promote the cause of truth. They awaken usually all the angry passions, and not unfrequently rouse feelings the reverse of benevolent; and in the midst of the tempest of discord, and animosity which they have produced, the original object, the establishment of what is just and true, is most commonly entirely forgotten. A more judicious plan is to persevere steadily, though cautiously, in the continuance of the method which is the subject of discussion; to ascertain its demerits and its disadvantages, as well as its merits; and to place them fairly before the eyes of all competent judges. This Dr Conolly has now done, and, so far as the experiment has proceeded, satisfactorily; and he has his reward in the general acknowledgment of the superiority of the method over that by restraint and coercion, and also in the well-established fact, that means of coercion were not only unnecessarily adopted in a very large proportion of cases, but that they invariably proved detrimental, rendered the furious more furious and brutal, and retarded the recovery of all.

Objections have been also urged, more or less strongly, against the universal abolition of means of restraint; and those, who have allowed that it was carried to too great an extent and very much abused, have nevertheless contended that it could not be universally abandoned, and that there occurred, and might occur, cases in which it was quite impossible to dispense with the agent.

"Several hypothetical, and some real cases," says Dr Conolly, "of complicated difficulty have been adduced as proving that there were many forms of mental disorder wholly unmanageable without restraints. Having never presumed to say that no possible case could ever occur in which a resort to restraints might be found convenient, the resident physician has perused these cases carefully. Of all of them it may be observed, that they would have been more complete if an attempt to treat them without restraint had formed any part of the narrative. Apparently such attempts were not made; and the impossibility of doing so was only assumed. It has also been with surprise that he has not yet met with one related case—with one imaginary combination of danger and difficulty—of which he does not know, from actual observation, that the management is practicable, and the evils are avoidable, without having recourse to such measures."—P. 35.

Additional confirmation of the superiority of the non-coercion method is afforded by the effects of its use in various other asylums, as Lincoln, where it was first introduced; Melton in Suffolk, Northampton, and Lancaster,—the last, the largest asylum, next to Hanwell, in Great Britain. In Scotland, also, we know that its effects have been most beneficial, wherever it has been fully and fairly tried. Thus, in the large asylum of Glasgow, under the care of Dr Hutcheson, the system which was formerly tried there without imperfect success, has now, under more adequate means, been completely successful.

"Within the last three years," says Dr Hutcheson, "personal restraint in this asylum having been very much modified, and almost abolished, since it did not amount to more than two per cent. I endeavoured to do without it. On that occasion, in consequence of circumstances over which I had no control, the attempt was unsuccessful. During the last year, various obstacles having been removed, my plans better laid, and having the aid of my clinical assistants, I was enabled to abolish it altogether; and the result, hitherto, has been perfectly satisfactory. The success of this measure cannot be attributed to an influx of mild cases, or to any other circumstance than the excellence of the plan. Situated as we are, in a manufacturing and commercial district, the patients from which are always more unmanageable than those from agricultural districts, and having to contend with the *perfervidum ingenium Scotorum,* which is to be matched only in Lancashire, as far as I know—with a building constructed on very different views, inconvenient, and crowded,—I have been enabled to carry out the system completely, without increasing the number of the attendants, and with the happiest effects. Not only are the patients quieter and more orderly, but a great saving of glass, furniture, bedding, &c. has been effected, the amount of seclusion has been diminished, and the habits of the patients have been much improved. Nor is this effected by substituting the force of men's arms for that of muffs and belts. Those who represent this as the system of non-restraint pursued at Hanwell, Northampton, Lancaster, and Glasgow, have never given themselves the trouble to inquire into the subject. Greater attention, forbearance, tact, and kindness, are required in the attendants; but there is much less struggling and less physical force used than under the old system. If it were merely the substitution of the muscles and sinews of impassioned men and women, instead of the cool unimpassioned force of leather, the system could not be defended; and if it led to prolonged seclusion or confinement, to the deterioration of health and the aggravation of the mental disorder, it would deserve all the opprobrium which has been cast upon it by its opponents. But the contrary is the case. There is much less violence and struggling, there is less destruction of property, there is infinitely less seclusion, and there is greater attention necessarily paid to the patients by the attendants, than under the old plan of restraint. Above all, as no excessive fury or violence can take place without a cause, which may be detected and removed, the physician is necessarily forced to examine into and remove it. I am, therefore, of opinion, that personal mechanical restraint is in no case necessary for the mere treatment of insanity in an asylum, and that in all cases it is prejudicial. I have tried both plans on a large scale, and I now express my deliberate opinion, on which I shall continue to act. The asylum which is now building, is constructed expressly with this view. It would be injustice not to mention, that to Dr Conolly of Hanwell, and Dr Prichard of Northampton, I am indebted for many hints and contrivances for carrying out non-restraint."—Pp. 39-40.

We see also from the short but interesting report of Dr Browne on the Crichton Asylum at Dumfries, that means of employment and amusement are so arranged and provided as to supersede entirely the use of restraint, and it is stated in the report, that only "one patient was restrained for three hours, for the purpose of carrying into effect the directions of the physician, and of associating acts of violence and defiance into a feeling of inconvenience and degradation."—P. 13.

One of the great substitutes for restraint, in addition to occucupation, and, above all, occupation of the mind, is seclusion; and accordingly, this has been employed at Hanwell, whenever the state of patients required it. On this part of the treatment, also, misconception, if not misrepresentation, has been allowed to prevail. The views of Dr Conolly are best stated in his own way:

"The resident physician would earnestly impress upon all who may do him the honour to refer to his reports with a desire either to form a judgment of the plan pursued at Hanwell, or an intention of adopting it, the necessity of considering all its parts; of which the discontinuance of mechanical restraints is only one. It is especially necessary to be guarded against the extravagant notions of seclusion set forth by the opponents of the non-restraint system. A reference to the report of last year, in which this very important particular of treatment was fully described, will show, that instead of being an imprisonment, productive of every moral and physical evil, it is a simple exclusion from the irritable brain of all external causes of additional irritation; that it places the patient in security, without fretting him by muscular bindings and impediment of limbs; that it secures other patients from danger, and the violent patient from injury when in restraint and defenceless, whilst it removes from his companions a spectacle always displeasing and often alarming to them, that of a patient, who if at large, must be degraded by the muff or sleeves; that it very seldom fails to tranquillize the patient in a short time, and is even generally productive of immediate composure; that with all this, it is easily effected, whereas the imposition of restraint was often only accomplished after a severe and irritating struggle, and was almost most difficult when most required; and, lastly, that it has no general tendency to leave a revengeful feeling in the patient's mind.

"But to secure these advantages of seclusion, it must be remembered, that the term is applied to the temporary confinement of a lunatic in his own bed-room; sometimes with the light partially excluded, sometimes almost entirely; that it must not be hastily resorted to; not carried into effect with anger, but steadily accomplished, when persuasion fails, by a sufficient number of attendants; that it must not be accompanied with irritating expressions; nor applied as a punishment; nor unreasonably prolonged. All instances of seclusion should be promptly reported to the medical officer or matron; the state of the patient in seclusion should be ascertained from time to time through the inspection plate; and any appearance of contrition should be met with kindness. After half an hour, or one hour, or two hours, in different cases, the practicability of putting an end to the seclusion should be tried; except in instances where a longer repose of the brain is plainly required.

"This is the manner in which seclusion is directed to be practised at Hanwell; and although there are many days in the year in which there is not a single patient in seclusion during any part of the day, opportunities of witnessing its remarkable influence in inducing quietness are of course frequently afforded. In conducting visitors through the asylum, their attention is generally directed to the cases actually in seclusion, and whom they are commonly able to observe without occasioning them any disturbance.

"These advantages, there is every reason to think, were never derived from any form of mechanical restraint. The resident physician is aware that an opinion is entertained by a few respectable authorities that restraint exercises a salutary moral effect. He can recal no instance in which it seemed to him to do so. It has also been said that patients accustomed to violent attacks of mania, will beg to be put in restraints. He does not disbelieve this; but he has never met with an instance of it. He has occasionally known patients beg that restraints might be put on other patients: he never knew them ask to have it put on themselves. He has met with one instance in which a patient who recovered some years ago, states that when he was excited he always felt secure as soon as restraints were put on. The same individual, however, is now liable to attacks of excitement; but never solicits to be put in restraint of any kind. Patients liable to attacks of mania in a house where restraints are much employed, regard the accession of an attack with terror; but it is quite possible to screen them from every danger without restraint. The indignation of those on whom restraints were forcibly imposed; their eloquent exposition of its degrading and maddening effects; their fierceness when running about the wards in a strait-waistcoat; the alarm and discontent their presence occasioned to other patients; their speechless joy, their sobs and tears, when unexpectedly liberated, when both in seclusion and restraint, in the midst of a paroxysm of reproaches prolonged until they were covered with perspiration and their lips were literally covered with foam, —are things of which the memory can never be effaced from the mind; and they make the ear deaf to specious representations of the comforts of straps and strait-waistcoats. When these results are contrasted with those of simple seclusion; when the angriness, the ferocity, and sullenness characteristic of some of the wards in which restraints were habitually employed (as in the epileptic wards), are compared with the present indications of confidence and general good temper, the firm impression left is, that the general bad effects of restraint and its liability to abuse are immeasurably more pernicious than anything that can be occasioned by its discontinuance.

"After the trial already made at Hanwell, and a frequent revision of every kind of troublesome case, the resident physician can only concede that there would be some convenience in putting certain patients in restraint, who have the inconvenient habit of suddenly striking those about them. But even this convenience would only be temporary, for it cannot be continually applied. Seclusion, therefore, although it does not wholly remove the difficulty of such cases, is a better temporary resource, as it neither leaves the patient offended, nor aggravates his combative propensity, which restraint always seemed to do in exact proportion to its severity and duration. No patients in the asylum were more dangerous to approach than those who were fastened every day in restraint-chairs; and no patients have improved more signally since their entire liberation."—Pp. 36–39.

One word more on restraint, its effects, and its disuse, and we finish.

"One cherished error of the advocates of restraint is, that it can at least do no harm to the incurable. The fact is, that no patients are more permanently injured by it, in temper, feelings, and habits."—P. 39

"A memorandum relative to restraints, furnished by Mrs Bowden (late Miss Powell), the matron, comprehends 41 cases, almost all of which were in constant restraint of some kind or other previous to September 1839. Fourteen of these patients were almost always fastened in restraint-chairs, and twenty were almost always in a kind of strait-waistcoat called sleeves; several were in complicated restraints, and some in a chair, and at the same time in sleeves, or the muff, or in leg-locks. All these patients were liberated before the end of September 1839. Not one of them has been in restraint since. Thirty-seven are yet in the asylum, and there is not one who may not be pointed out as an instance of the improvement of the mental faculties, or of the habits, in consequence of never being subjected to restraints during two years. Some, who were considered dangerous at all times, are now occasionally seen at the work-table, smiling, and pointing out what they have done. Some who were sinking into dementia, or imbecility, are now lively and talkative. Some who were said to pursue visitors through the ward, are now never known to do so. The brief statement of the past and present condition of these patients, is one of the most interesting documents ever drawn up in any lunatic asylum, although its preparation is only one of many important services rendered by the matron to the cause of the poor lunatic.

"As at that time no reports were ever made, or records kept, by the attendants of the patients in restraint; whilst closets full of instruments of restraint were at their command—it was impossible for the resident physician ever to know, by night or by day, how many of the patients whom it was his duty to protect were in actual bondage.

"It was curiously indicative of the perversion of feeling engendered by long familiarity with restraint, that there was no part of the asylum in which they were more freely employed than in the female infirmary; and to one instructive instance of their misapplication the resident physician must ever acknowledge himself indebted, as the cause of his being more immediately roused to forbid practices on which he had always looked with dissatisfaction."—Pp. 40-41.

The removal of means of restraint and coercion may be regarded as the rejection of what is positively hurtful to the insane, and opposed to their recovery under any circumstances; while the substitution of seclusion is a means more efficient of removing various sources of irritation, or counteracting their effects. This, however, is not enough in the treatment of deranged mind; and it is above all requisite to ascertain whether any of the corporeal organs, or their functions, are disordered, and, above all, whether the brain or its membranes, or its circulation are disturbed; and whether this disturbance is seated in the organ itself, or is reflected from some other diseased organ.

At one time a good deal of not very rational declamation was indulged in regarding the needlessness, and sometimes the inefficacy, or even the hurtfulness of medical treatment in the management of the insane. All medical treatment, it was said, was observed to be either useless or hurtful; and it was further argued, that the insane were often in perfect bodily health; that the mind only was wrong and distempered; and that, consequently, mere medical treatment was unnecessary. It is quite clear, in answer to these arguments, that where medical treatment was observed, or rather seemed, to be useless or hurtful, it could never be fully or fairly tried; and we further venture to assert that there never was a case of mental derangement without some degree or form of corporeal disease. Against this hallucination, however, we do not now mean to reason. It has either been gradually dissipated before the progress of better information, or those by whom it was maintained have been delivered from its influence. We are happy to see that in the Retreat, where, in consequence of the ready transition from one extreme to another, this fancy of excluding medical measures and treatment prevailed rather much, the beneficial effects of judicious and seasonable treatment are now admitted. Though it appears to have been chiefly against the routine treatment of blood-letting, emetising, and purging periodically the insane, that the officers of the Retreat elevated their protest, and though medical treatment was not wholly discarded, yet it did not hold that important position to which it was entitled. Now, however, we are assured that its value and efficacy are unequivocally recognized.

On this subject we are happy to observe the testimony of Dr Conolly and Dr Hutcheson are equally decided and conclusive.

On other therapeutic measures, as occupation, amusement, instruction, religious instruction, and devotional exercises, all are agreed as to the efficacy in certain states of the insane. On one amusement certainly some doubts may be entertained. We allude to the mixed dancing of both sexes, where probably some of the feelings may be more excited than is safe and convenient. On this point we like to see the judicious advice of Dr Hutcheson, who, while he says that for females of all classes, dancing affords a useful means of exercise in the evenings, adds, " but of patients of both sexes mingling in the dance, I totally disapprove."

Various other topics besides the great one of the improved method of treatment, it was our intention at this time to have taken into consideration. We find, however, that neither limits nor time will permit us. We intended, for instance, to have taken occasion, from the excellent and elaborate statistical report of Mr William Farr, to bring before our readers the question of the mortality of lunatics, the causes of the mortality, and whether mental derangement has a tendency to shorten the duration of life. In directing attention to the tract of Dr Webster, it was further our wish to have inquired into the merits of the proposal of admitting medical pupils into the wards of Bethlem Hospital, and similar asylums or establishments, for the purpose of studying mental diseases. These two subjects alone are most important and difficult, and to do them justice would require a separate article to each. All that is here left us, therefore, is merely to glance at them in a very cursory manner.

It appears from the researches and calculations of Mr Farr, that insanity is rather a fatal disease. In the Hanwell Asylum, more than half the patients die, viz. 56 per cent., and more than one-third are cured, viz. 38 per cent. In the licensed houses under the Metropolitan Commission, 30 deaths take place in 100 cases. But when the duration of residence in the respective institutions is considered, so as to ascertain the annual mortality per cent. the proportions are reversed. being 15.5 per cent. in the licensed houses annually, and only 11.9 per cent. at Hanwell annually. This difference depends on the fact, that patients remain longer in the Hanwell Asylum than in the licensed houses.

This mortality is heaviest among paupers. But in the licensed houses, the annual mortality per cent. though high, is greatly higher among this class of patients. It appears, indeed, from the tabular statements in the tract now before us, that the annual mortality of both male and female paupers in the licensed houses is nearly twice as great as the mortality of paupers at Hanwell, and twice as great as the mortality of other lunatics, that is, of the middle and upper classes in the licensed houses. It appears further, that the mortality in the large licensed establishments is nearly twice as high as in the smaller houses.

"We have no means," says Mr Farr, "of ascertaining the mortality of lunatics at large; but the mortality of lunatics in asylums is much higher than the mortality of the general population; and the excess cannot be ascribed entirely, though it may partially, to the confinement, the unwholesomeness or the usages of madhouses. The mean age of lunatics in asylums is 35—40." At this age the annual mortality is not more than 2 per cent. The annual mortality at Bethlem, where dangerous cases are excluded, was in 1827—1839, 9 per cent. At Gloucester, one of the county asylums where the treatment is most successful, the diet nutritious, and the patients live much in the open air, the mean annual mortality is 7 per cent. At the most favourable computation, then, the mortality in cases of insanity is at least three times greater than among the general population at the same age.

The mortality of 7 per cent., Mr Farr thinks, may justly be regarded as the proper mortality of insanity. But any excess above this, he thinks, must be attributed to disease induced by the peculiar circumstances in which lunatics are placed. Of these the most remarkable and obvious are, limitation of space, implying imperfect ventilation and want of fresh air, want of exercise and warmth, poor unvaried diet, want of medical attendance, and perhaps want of proper mental occupation. These circumstances operate more energetically upon a frame already diseased, than they would or can do on one in average health. Many of the insane, we can say from personal observation, die from chronic pneumonia, phthisis, and disease of the intestinal tube. Others die from apoplexy or palsy.

Of the proposition of Dr Webster, it would be rash to speak at large in this brief sketch. It may be sufficient to say, that it seems quite practicable in the case of pauper lunatics and institutions maintained at the public expense. But we believe that some opposition might be raised against the plan, if it were introduced indiscriminately into all asylums, and patients from the upper ranks of society thus exposed to the gaze of strangers. It is impossible, nevertheless, to doubt that, from this proposition, if carried into effect, in such a manner as not to do injury to the patients, much benefit must accrue in furnishing physicians with the means of studying this distemper in all its varieties, more fully and attentively than has been hitherto done.

The tract of Dr Webster deserves the serious attention of the governors of lunatic asylums and similar establishments.

PART III.

MEDICAL INTELLIGENCE.

ANATOMY AND PHYSIOLOGY.

Case of Double Vagina and Uterus. By Dr **Fricke.** (*Fricke und Oppenheim's Zeitschrift fur die Gesammte Medicin*, October 1841.)—A woman, 21 years of age, who menstruated at the age of 14, contracted a syphilitic affection at the age of 19, of which she was cured in about two months, and again on the 17th of September 1840, for which she was received into the Venereal Hospital. On examination it was ascertained that the vagina and neck of the uterus were double, a fact of which she was herself ignorant. The labia, though strongly developed, were normal, but the left nympha, which was very large, projected between them and concealed the right one. When these parts were separated a fleshy pale red bridge or partition was observed extending from the posterior edge of the urethral canal to the posterior wall of the vagina, where it was attached a little to the right of the median line. Where it was attached to the orifice of the urethra it was about an inch to an inch and quarter broad, so that it embraced that orifice; it was thinned in the middle, and again spread out at its attachment to the posterior wall of the vagina. This bridge, dividing the orifice of the vagina into two, was found to be the free extremity of a fleshy division which extended the whole length of that canal, and was about two lines in thickness through all its length. It divided the vagina into two canals, of which that on the right was the usual size of an ordinary vagina; the other was of more narrow dimensions. At the extremity of the larger canal the neck of a uterus was distinctly felt and seen, having an orifice about a third smaller than usual. The narrower vagina, on the left, was of sufficient size to permit of the introduction of the finger, and even of a small speculum. By means of this instrument it was ascertained that it too was furnished with an uterine neck and orifice, but still smaller than that on the right side. A sound introduced into the smaller uterus penetrated to the depth of three-quarters of an inch, whilst that introduced into the larger one penetrated to the depth of an inch and a-quarter to an inch and a-half. The extremities of the sounds introduced into both orifices at the same time to see whether the uterus was double did not meet. As far as could be ascertained from a vaginal examination, the necks of the two uteri seemed to be separated from each other by about half-an inch.

Organs for the Secretion of Sweat. By Dr **Giraldes.** (*Comptes Rendus des Seances de l'Academie des Sciences*, August 1841.)—The organs which secrete the sweat, which were first pointed out by Breschet, and afterwards described by Purkinje, Gurlt, Wagner, Serres, Arnold, Madden, and others, Dr Giraldes has studied more particularly, and added a few additional facts. These glands exist in great numbers in the palm of the hand, and in the soles of the feet, in which situations they are very numerous, and, being well developed, are more easily examined than elsewhere. They exist also, and are of tolerable size, in all the spots covered with hair, as the arm-pits, perinæum, scalp, &c. They are also seen over the whole surface of the derma; but are there extremely small, almost rudimentary. These organs are composed, according to Dr Giraldes, not of simple canals divided at their extremity, but of a straight canal, which pierces through the whole thickness of the derma, and is imbedded in the fatty layer beneath it. Sometimes they penetrate this fatty layer to a very considerable depth; at the extremities of the fingers they even seem to traverse it completely. Arrived at this point, these canals sometimes dichotomize; in general, however, they remain simple, and roll on themselves, so as to form a small button-shaped body. These convolutions are sometimes all on the same plane; at other times, so as to form a spheroidal appearance. Dr Giraldes states that he has shown this structure to Professor Serres.

Cases proving the influence of the Cerebro-Spinal Axis in the production of Animal Heat. By M. BRUGNOLI. (*Bulletino delle Scienze Mediche,* October 1841.)—As pathological facts are, generally speaking, superior to experiments on living animals, in so far as the modifying powers of the nervous system over the various functions of the body are concerned, the following four cases bearing on the influence of the cerebro-spinal axis on the production of animal heat, will be read with interest.

1. A woman, 45 years of age, after having long suffered from severe pain in the head accompanied with vertigo, entered the hospital in the following state. Her look was expressive of pain, and she supported the head with both her hands in its every movement. She complained of severe and fixed pain in the occipital region. The respiration and circulation were natural. Her extremities were cold, the upper more so than the lower, and this coldness continued to increase without being relieved by any remedy. Deglutition became difficult after a while, and she died after a period of two months. A rounded cyst, about an inch in diameter, and full of whitish-green purulent matter, occupied the posterior part of the right lobe of the cerebellum, but made no visible projection on the surface.

2. A woman, 75 years of age, entered the hospital for a trifling affection of the digestive organs, where she was soon seized with new symptoms in the form of stupor, difficulty of speech, and violent pain in the head. All the limbs retained their mobility, but the upper extremities and the upper half of the trunk of the body became as cold as marble. The respiration and circulation did not, however, appear to suffer materially. Every remedy failed to restore the heat, and she died after five days of suffering. The left hemisphere of the cerebellum contained an apoplectic effusion of the size of a large walnut.

3. A soldier came into the hospital on account of a fixed severe pain in the dorsal region accompanied by feverish symptoms. When there, he had an attack of pneumonia, from which he made a slow and bad recovery. Towards the end of winter a new sensation began to be complained of; this was a sensation of coldness, which he could not remove either by additional clothing or any remedy. This sensation of coldness progressively increased, but did not seem to affect the respiration or circulation. No symptom of paralysis was observed, and his intellectual faculties seemed to be perfect to the day of his death, which took place eleven months after his entering the hospital. The eighth, ninth, and tenth dorsal vertebræ were carious, and an abscess lay over their anterior surface. The spinal marrow, for an extent of about two inches opposite these vertebræ, was in a state of atrophy.

4. A vigorous and robust porter, 30 years of age, was seized, after lift-

ing a heavy burden, with general uneasiness and a sensation of intense cold, which developed itself over all the surface of the body, especially when the surface was touched, though the heat was actually greater than natural. The movements of the body, and the pronunciation of words, were executed with great slowness. The pulse was strong, severe pain was complained of in the head, and his anxiety was great. He died on the fourth day. Coagulated blood was found extravasated beneath the theca of the spinal marrow from the origin of the first dorsal nerves to the extremity of the spinal marrow. The vessels of the substance of the spinal marrow itself were also strongly injected.

M. Brugnoli thinks the above cases demonstrative of the influence of the cerebro-spinal axis on the development of animal heat. One or two foreign periodicals, which also notice these cases, agree with M. Brugnoli that the cases seem to lead to that conclusion.

On the influence of the Nerves on Muscular Irritability. By M. LONGET. (*Comptes Rendus des Seances de l'Academie des Sciences,* July 1841.) —M. Longet found, that when a nerve of voluntary motion was cut across, on the fourth day thereafter, the muscles to which it was distributed could not be excited to contract by irritating the nerve by means of a weak galvanic current. The muscles, however, supplied by this nerve contract immediately on the application of the slightest stimulus to themselves, even at the end of fifteen days. Even after the lapse of a month, direct stimulation causes them to contract slightly, and may be recognized at the end of seven weeks; no irritation of the nervous twigs, however, excites the slightest motion after the fourth day. From the seventh week, the muscular fibre, already much blanched, seems to undergo a complete degeneration, and soon ceases to contract in the slightest, even with the most powerful stimulants. It is only then in consequence of a lesion of its nutrition that muscular fibre, in losing its organic characters, loses also its essential characteristic, irritability, which, however, as has been seen, remains a long time after all nervous influence has been suppressed.

On Fibre. By MARTIN BARRY, M. D. (*Abstract of the Proceedings of the Royal Society,* 1842.)—Dr Barry observes that in the mature blood-corpuscle there is often seen a flat filament already formed within it. In mammalia this filament is frequently annular. In birds, amphibia, and fishes, the filament is so long as to form a coil. This filament, he states, is formed of discs contained within the blood corpuscles. At the outer part of the coil, the filament, which is flat, often presents its edge, whilst in the centre there is generally found the unappropriated part of a nucleus. The nucleus, he says, in many cases resembles a ball of twine, being composed, at its outer part, of a coiled filament. In the invertebrata, examined by Dr Barry, it is stated that the blood-corpuscle was likewise seen passing into a coil. This coil filament is described as being not only flat, but deeply grooved on both surfaces, and consequently thinner in the middle than at the edges, which were rounded, so that when seen edgewise the filament seemed to consist of segments.

It is mentioned that portions of the clot of blood consist of filaments having a structure identical with that found within the blood corpuscle. Dr Barry states that he has seen the ring in the blood corpuscle of man, and the coil in that of birds and reptiles, unwind themselves into the straight and often parallel filaments of the clot. This appearance, he states, may be seen in blood placed under the microscope before its coagulation, and that filaments having the same structure may be met with in every tissue of the body.

He found the same filaments to exist in all vegetable structures, and he states that this, which he denominates a filament, is what has been usually described as a fibre. By a kind of apparent analogy, Dr Barry endeavours to show that two spirals running in opposite directions, and interlacing at certain regular intervals, would produce an appearance which he could not distinguish from the simple filament, and he asserts that such an interlacement of two fibres would both produce a flat fibre, and also give it a grooved appearance. This, he asserts, is, in fact, the true structure of the fibre or *flat filament*, as he terms it. The edges of this filament present an appearance of segments; but this he states is to be attributed to the consecutive curves of a spiral thread. The ultimate fibre or minutest filament, he states, has this structure.

He hence asserts that the spiral arrangement is as general in the animal tissues as in vegetables. Nervous tissue, muscle, minute blood-vessels, and the crystalline lens are adduced in proof of his statements, and he even infers that spirals are as universal as the fibrous structure itself.

Dr Barry states that the spiral form manifests itself very early, and refers to the corpuscle of blood in proof of this statement. Dr Barry also states he observed, in the cartilages of the ear of a rabbit, the nucleus lying loose in its cell, resembling a ball of twine, being composed at its outer part of a coiled filament which it was giving off to weave the cell-wall.

Dr Barry traces the formation of muscle out of cells, which, according to his observations, are derived from corpuscles of the blood. In this process he states he has observed the formation of a second order of tubes within the original tube; a peculiarly regular arrangement of discs within these second tubes; the formation, first of rings and then of spirals out of discs so arranged; the interlacing of the spiral; and the origin, in the space circumscribed by those, of spirals having a minuter size, which, in their turn surround others still more minute. The outer spirals are stated to enter into the formation of the investing membrane described by Schwann and Bowman. The inner spirals constitute what are usually termed fibrillæ, or which he terms a *flat filament*, and which, he asserts, is a compound structure. He asserts this fibril is not round and beaded, but flat and grooved, and, (if we understand the author aright) always "presents its edge to the observer," in voluntary muscles. In Dr Barry's opinion, the dark longitudinal striæ are spaces, probably occupied by a lubricating fluid, between the edges of flat filaments, each filament being composed of two spiral threads, and the dark transverse striæ, rows of spaces between the curves of these spiral threads. He appears to attribute the contraction of a muscle to the contraction of the supposed spirals.

He states that the toothed fibre of the crystalline lens, described by Sir David Brewster, is formed of an enlarged filament, the projecting portions of the spiral thread becoming the teeth of that fibre.

The compound filaments are stated to be seen with peculiar distinctness in the blood-vessels of the arachnoid membrane. In connection with the spiral direction of the outer filaments in these vessels, Dr Barry refers to the rouleaux in which the red blood discs are seen to arrange themselves under the microscope, as probably indicating a tendency to produce spiral fibres.

Dr Martin Barry begs to acknowledge the attention of the Editor of the Edinburgh Medical and Surgical Journal, in replying to his note, and in referring him to Wagner's Elements of Physiology (by Willis), for the proof, as requested, that he, (Dr M. B.) had been anticipated by Valentin in the discovery that the fibres of the crystalline lens are formed out of "coalesced cells, at first arranged in the same manner as beads in a necklace." Dr M. Barry unhesitatingly yields the priority to Valentin, *of whose discovery he was not previously aware.* That he should have happened to use, as the Edinburgh Journal states, the "same comparison" ("beads in a necklace") as that employed by Wagner's translator (" a string of beads"), will be easily understood by those who know how common it is to meet with the appearance in question, and how frequently that simile is employed.

As to the two other points mentioned in the Edinburgh Journal (April 1, 1842, p. 511), Dr M. Barry would, with the same willingness, admit that he had been anticipated by Valentin, had he found such to be the fact. Under these circumstances, Dr M. B. thinks it is due to him that the reviewer in the Edinburgh Journal should quote the passages in which it is alleged that he has been anticipated by the researches of Valentin: for, as to the page (p. 217 of Willis's translation of Wagner) given in the Editor's MS. reply, there is nothing in it upon the subject. In several other pages too, where the subject is mentioned, Dr M. Barry's views have not been anticipated; and in some of them doctrines are promulgated to which his observations are directly opposed; as, for instance, in the following remarks of Valentin. (P. 265.) " We see plainly round or square-shaped granules, applying themselves around the nucleoli;" and it is added, (same page,) " *This is the type of the mode in which the nucleus universally originates, and attains its development.*" Nothing can be more different than this from one of Dr M. Barry's views; which is, as stated by the Edinburgh Journal, (P. 511,) " that the nucleolus is not a distinct body existing before the nucleus." Yet, singular enough, the work now quoted is the one to which he is referred in proof, that on this subject he had been anticipated by Professor Valentin.

With regard to the changes taking place in the nucleus of the cell, Dr M. Barry has elsewhere* referred to the opinions of Valentin, of much more recent date; stating them to be entirely different from his own.

London, 17th 5th mo. (May) 1842.

Influence of the Pneumogastric Nerve on the Movements of the Stomach. By M. LONGET. (*Comptes Rendus des Seances de l'Academie des Sciences,* 14th February 1842.)—M. Longet having opened many dogs, assertained that, in the greater number of them, irritation of the pneumogastric nerves produced contraction of the stomach. Frequently, during his experiments, he saw the stomach assume the hour-glass form. In a few dogs, the movements of the stomach, on the irritation of the nerve, were scarcely apparent. After repeating his experiments on 40 dogs, M. Longet recognized that the difference in the results obtained depended on the condition of the stomach itself. Thus, if the animal was opened when the stomach was full, irritation of the pneumogastric nerves produced the most marked movements of the stomach; but, when empty, scarcely any movement was excited; in fact, the movements were feeble, just in proportion to the time which elapsed from the period of chymification, or filling of the stomach. He thought these observations explained the very different results which experimentalists have arrived at regarding the influence of these nerves over the movements of the stomach; as if, they experimented when the stomach was in different states, they might logically arrive at opposite conclusions from the same kind of experiment. He was never able to excite any movement of the coats of the stomach by irritating or galvanizing the filaments of the great sympathetic, or the semilunar ganglia.

On the Blood-Globules, their mode of Formation, and their Use. By M. DONNE. (*Comptes Rendus des Seances de l'Academie des Sciences,* 7th March 1842.)—M. Donné recognizes three kinds of particles in the blood,

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* Phil. Trans. 1841, Part. II. p. 203.

—red globules, or blood-globules, properly so called, white globules, and globulines of chyle, as he calls them. The red globules are flat in all kinds of blood; circular in the mammalia; elliptical in fishes, reptiles, and birds. The elliptical globules alone have a solid substance in their interior; no similar appearance has he been able to detect in the circular globules. Water, he says, renders the flat blood-globule spherical; and acetic acid dissolves completely the round globules of the mammalia, but leaves an insoluble portion in the elliptical globules of birds, reptiles, and fishes. This insoluble portion, he says, is the central nucleus. He therefore regards the blood-globule as composed of a flattened vesicle containing a solid nucleus in the elliptical globules, and a fluid only in the circular ones. The elliptical blood-globule of the camel he found no exception to the general rule that those of the mammalia have no central nucleus.

The white globules he describes as colourless, irregular in their contour, and having a granular aspect, and exist in the blood of all animals. Water breaks them up, and he imagines them to be composed of a cyst containing three or four solid granules.

The globulines again he describes as extremely small granules similar to those of the chyle.

M. Donné gives the following theory of the mode of formation and uses of these different parts. The globulines are the product of the chyle, which is continually being added to the blood. Three or four of these unite together, and whilst circulating with the blood, receive an albuminous envelope. They thus form the white globules. The white globules once formed change little by little their forms; become flattened, coloured; the granular matter in their interior becomes homogeneous or dissolved, and they are thus transformed into the red or proper blood-globules. The blood-globules themselves have only a passing existence; they dissolve after a certain time, and constitute the so-called *liquor sanguinis*. He says that certain substances, as milk, are capable of being immediately transformed into blood-globules by being injected into the blood-vessels; and he regards the spleen as the organ more especially charged with the important function of the manufacture of blood-globules. He adds, that a minute examination of the vascular tissues shows, that at no point do the blood-globules leave their vessels to assist in the formation of the organs of the body, or to unite with other organic elements. Hence, he infers, it must be the fluid part of the blood which transudes through the vascular walls, and that this part must be the fluid essentially concerned in the process of organization.

On the Effects of an impermeable Covering applied to the Skin. By MM. Becquerel and Breschet. (*Comptes Rendus des Seances de l'Acadamie des Sciences*, October 1841.)—MM. Becquerel and Breschet read a paper before the Academy of Sciences, on the temperature of the organic tissues of animals, and especially of rabbits, the hair of which had been shaved off, and the skin covered with an impermeable coating of strong glue, of suet, and of resin. It was found that the animals died very shortly after being covered with such a coating, and these experimenters thought it was by a process of asphyxia, in consequence of the transpiration from the skin being prevented. It would appear that they expected, from the natural transpiration being prevented by the impermeable coating, that the temperature of the animal would increase, and that a violent fever would be produced, under which the animal would expire. But the very opposite happened. Thus, the temperature of the first rabbit, before it was shaved and covered with the impermeable coating, was 38° Cent. but immediately after the coating was dried it was found that the muscles of the thigh and of the breast had fallen in temperature to 32° Cent. An hour afterwards, the temperature had fallen to 24.°5 Cent. In another rabbit, the coating on which was put with more care, as soon as the coating was dried, its temperature was found to have fallen so much as to be only 3° above that of the surrounding atmosphere, which was on that day 17° Cent. One hour after this the animal died.

These experimentalists afterwards made some experiments in order to ascertain the relative difference of heat between venous and arterial blood. They introduced delicate thermometers for this purpose into the auricles of the heart of dogs, and invariably found that the arterial blood was a few fractions of a degree higher than that of the venous blood.

On the coloration of Bones by Madder. By MM. Serres and Doyère. (*Comptes Rendus des Seances de l'Academie des Sciences*, 21st February 1842.)—MM. Serres and Doyère have been engaged for upwards of two years in a long course of experiments on the coloration of the bones of the living animals by feeding them with madder, and have at length arrived at some very curious and interesting results both with regard to that subject and the mode in which bone is formed. They found that when an animal was fed for a long time on madder, not only were the bones coloured of a rose hue, but all the other solids and fluids of the body, with the exception of the tendons and cartilages and the white substance of the brain. In the bones alone they found this colour to be permanently fixed, and not removable by maceration, nor by certain chemical solvents of the colouring matter of madder. Maceration, however, removed the colouring matter from all the other tissues. They ascertained, from a chemical investigation, that it was the phosphate of lime which held permanent the colouring matter of madder in the bones. They found that the colouring matter did not penetrate the bones to any depth, but the distribution of the colour was remarkable as throwing much light on the true structure of the osseous tissue.

When a long bone coloured with madder is sawed transversely, the coloured portion is observed to penetrate but a little depth, forming, as it were, a circle round the bone. When this section is examined by means of a magnifying power of twenty diameters or so, the colouring matter is seen to exist as red points scattered over a white ground. When a power of two or three hundred diameters is used, each point is seen to be in reality a coloured circle surrounding a round aperture in the substance of the bone. A longitudinal section of the same bone exhibits the true structure of the bone more particularly: and proves that this rounded aperture seen surrounded by a coloured ring in the transverse section, was the section of a minute canal, or capillary vessel, which is more delicate as the animal is older. The coloured ring surrounding it was seen to be the walls of this canal, or that part of the bony structure which constituted its walls, and which differed in no respect from the uncoloured portion of the bony tissue which surrounded it.

The most exterior layer of colouring matter seen on the outer surface of the bone was found to consist of a coloured layer, as thin as that which was seen surrounding each bony capillary vessel in the interior of the bone. The bone then was seen only to be coloured at those portions which were in immediate contact with the capillary vessels of its tissue or of the periosteum, and at no other part.

MM. Serres and Doyère next pass to the examination of what it has been the custom of late to describe as the osseous corpuscles, and they show, by the simplest of all experiments, viz. by allowing a drop of oil to come in contact with a slice of bone under the microscope, that these so-called osseous corpuscles, on which so much stress has been laid, are neither more nor less than microscopic deceptions,—are, in fact, cavities or empty cells, which they think are possibly filled with a fluid during life, but not with the circulating fluid, as they are never coloured with madder.

These experimentalists ascertained another important fact. They fed a young pigeon with madder from the 10th March to the 15th of April 1840, when they amputated the wing, and found the bones deeply stained with the colouring matter. The madder was then stopped; it was nourished on the ordinary food of these animals; and on the 30th of January 1841, the other wing was cut off, from the effects of which operation it died. Though this was a young animal, only four months old when it lost its first wing, and though the bones had been exposed to the incessant vital actions for so many months after the madder was stopped, its bones, when it died, presented the very same depth of colour as the wing which had been amputated so many months before. MM. Serres and Doyère, therefore, justly infer, that the asserted incessant change or renewal of the molecules is not an essential condition of the living tissues, unless bones are henceforth to be ranged amongst the dead ones.

From these investigations, then, it appears that the staining of the bones by madder is purely a chemical process,—a species of dyeing. That in the coloured ring which the naked eye discovers on the long bones, the colouring matter is confined to that portion of the osseous tissue in contact with the periosteum, and that forming the immediate walls of the capillary vessels of the bone. That, as the distance of each capillary vessel from each other is more than double the breadth of the coloured layer surrounding each, even in the coloured ring the greater portion of the bone is really uncoloured, really white. And, lastly, that the dyeing of the bone is influenced by the mode in which the blood is distributed through it; some bones, from the peculiarities of their circulation, being coloured from within outwards, others from without inwards.

ORGANIC CHEMISTRY.

On the Azotized Nutritive Principles of Plants. By M. Liebig. (*Annalen der Chimie und Pharmacie,* Aug. 1841.)—Vegetable albumen, gluten, and legumen, to which might be added vegetable fibrine, are, properly speaking, the azotized nutritive principles of plants. Vegetable albumen, which is distinguished by its solubility in water, is found in the juices of plants, but chiefly in oleaginous seeds. Gluten is one of the chief ingredients of the seeds of the cereals. Legumen is chiefly found in the leguminous plants, as beans, peas, &c. These, with another substance which M. Liebig terms vegetable fibrine, form the proper nutriment of graminivorous animals, from which their blood is produced, and from which all the azotized portions of their bodies take their rise. It is in the vegetable kingdom that the nourishment of animals is in general prepared; for strictly speaking, carnivorous animals, when they consume other animals which have fed on vegetables, consume only those vegetable principles which have served the latter as nourishment. Every azotized animal substance has consequently its origin in plants.

In carnivorous animals, the process of nutrition is very simple, the nourishment they take is identically the same as the principal component parts of their own bodies. The flesh, blood, membranes, &c. which they consume are in no respect different (chemically speaking) from their own flesh and blood. The food of carnivorous animals assumes a new form in the stomach and organs of digestion, but its chemical composition suffers no change; it is simply made soluble, and thus becomes transferable to the different parts of the body, taking again the form of blood from which it originated. The vital action of these organs in digestion and the formation of blood in this class of animals seems to be confined to a mere change in the condition of the nutritive matter, as it is incapable of assimilation in the state in which it is taken.

The process of nutrition in graminivorous animals appears much more complicated, and the food has much less resemblance to the constituents of their bodies.

All plants which nourish graminivorous animals contain, besides the azotized compounds named, certain others absolutely necessary for the support of life, which yet contain no nitrogen. These compounds are evidently applied to some particular purpose, as they disappear in the organization, they without doubt take a part in certain processes which in carnivorous animals are conducted in a different manner.

After a succinct theoretical investigation of the mode in which these different vegetable principles would require to yield to one another the elements of which they are composed, if one or other did not possess the exact same composition as the animal solids or fluids, he shows by an elaborate chemical investigation that their vegetable principles undergo no chemical change in being assimilated to the animal structures. He first states the latest experiments made on the animal proximate principles, *fibrine*, *albumen*, and *casein*, which demonstrate that they possess the same exact amount of elementary principles; and on comparing "the composition of azotized vegetable substances with the principal component parts of animals, a most important fact is at once discovered, namely, that all those nutritive vegetable principles, whatever they may be, possess either the same composition as fibrine, albumen, and casein, or if the per centage be different, still have the same proportion of nitrogen and carbon as the animal substances possess. It is remarkable also that this resemblance goes still farther, for these vegetable substances conduct themselves in a similar manner with chemical reagents, so that we may say that their form is merely changed when animals produce blood and muscular fibre from them; for they are obtained from plants in a perfect state as far as the proportion of their elements is concerned. Graminivorous animals are fed on vegetable albumen, fibrine, and casein, which have therefore, chemically considered, the same composition, and in most cases, the same properties as their own blood, albumen, and muscular fibre."

We must refer to the paper itself for the lengthened and numerous chemical details regarding the identity of these vegetable principles, with those of the animal body, and merely state that he proves both from their chemical reactions and from the ultimate analysis, their identity. We copy one analysis of each of these vegetable substances to contrast with those of the animal principles.

Vegetable Principles.

	Fibrin.	Albumen.	Casein.	Gluten.
Carbon,	54·603	54·74	54·138	55·22
Nitrogen,	15·810	15·85	15·672	15·98
Hydrogen,	7·491	7·77	7·156	7·42
Oxygen, Sulphur, Phosphorus,	22·096	21·64	23·034	21·38

Animal Principles.

	Fibrin.	Albumen.	Casein.
Carbon,	54·56	54.48	54·96
Nitrogen,	15·72	15·70	15·80
Hydrogen,	6·90	7·01	7·15
Oxygen, Sulphur, Phosphorus,	22·82	22·81	22·09

From the facts which he states, M. Liebig draws many interesting physiological conclusions, some of which are speculative, others founded on facts; and mentions it as a remarkable fact, that even the inorganic ingredients are the same in both the animal and vegetable kingdoms.—When burnt, both leave similar ashes.

"Animals," says Liebig, "are distinguished from plants by their capability of moving from place to place, by their sensations and sensibility, or in one word, by their senses; for all these purposes certain organs are required, which are entirely awanting in plants. The same active principle, however, gives to the bud, the leaves, and the fibres of the root, the same wonderful properties. The plant is alive as truly as any part of the living animal body. They both receive on the same principle, the properties of growth, reproduction, and the power of replacing in the system what has been consumed. Of these properties vegetable life consists, it is developed without consciousness.

"Chemically speaking, animal life, though of an infinitely higher rank, generates only the substance of the nerves and of the brain, which are altogether awanting in plants. Although animals receive from vegetables all the ingredients requisite for the formation of blood, and cannot by their own organization generate them from carbonic acid and ammonia as plants do, the power belongs to them alone of producing those bodies of a higher order, such as the complex constituents of the brain, the spinal marrow, and the nerves. Animals must have peculiar organs for the exercise of the will, the feelings, and locomotion; and these organs must be produced from that part to which the impulse is given. Physiology gives us no decided information on these points. The spleen and the numerous glands must all have some part to perform in the body, and a necessary one too, or they certainly would not exist.

"The growth of plants depends on the continual supply of carbon and two other elements; and this supply is obtained by the separation of oxygen from the ingredients of their food. The growth of the organs of a graminivorous animal must depend also on a similar separation of oxygen. But we know, on the contrary, that the life of animals is characterized by a constant absorption of oxygen, although it does not remain in the body; and it is known, from a number of simple facts, that, besides the oxygen of the atmosphere, which escapes in combination with carbon, another portion arising from the food must escape also, under certain circumstances, as carbonic acid.

"This last oxygen arises from nutriment, which contains no nitrogen, when fat is formed. Starch, sugar, and gum, cannot be used by animals for the formation of blood or muscular fibre, because the azotized nourishment they receive contains all that is wanted. The membranes, the cellular tissue, skin, horn, and the claws of animals, contain more nitrogen in proportion to their carbon, than albumen or fibrine. These latter (albumen and fibrine) must give up a certain portion of their carbon, if the former (cellular tissue, &c.) are formed from the blood; that they are produced from substances with no nitrogen is impossible.

"Now we find that the flesh of graminivorous animals, and especially of domestic animals, which eat a great deal of food without nitrogen, is very fat, and that this fat may be increased by increasing the supply of this kind of food. The flesh of carnivorous animals is without fat and sinewy: all the food which they eat contains nitrogen, except the fat of the animals they devour.

"It is evident that starch, sugar, and gum, are incapable of supplying that loss which is continually occasioned in animals by the vital powers; they are incapable of forming muscular fibre, cerebral matter, the membranes, or the bones and sinews, because their only elements are carbon, and the elements of water. Children fed on such food become very fat, but neither their muscles nor their bones can increase, and they themselves therefore cannot become stronger."

M. Liebig then gives the chemical analysis of the fat of the pig, of sheep, and of man, and shows that it contains the same proportions of carbon and hydrogen as exist in amylin, sugar, and gum, so that, merely by giving up part of the oxygen, these vegetable principles may become fat, "the only substance which contains no nitrogen in the animal organization."

The fat, says M. Liebig, must have some use, and he inquires whether a certain portion of food without nitrogen is absolutely necessary to the existence of the life of animals merely for the sake of forming fat. Wild graminivorous animals have no fat, but more muscle than carnivorous; they become fat before the breeding seasons, or before hybernation, when they take no nourishment. This inquiry he sums up in the following terms:

"Man and every animal are exposed at every period of their lives to the unceasing and destructive action of the atmosphere; with every breath he draws out a part of his body; every moment of his life he produces carbonic acid, the carbon of which his food must replace.

"If we observe a man or other animal in sickness, or at any time when the body is not supplied with nourishment to compensate for the continual loss, we find him to become lean; the fat is the first to disappear; it vanishes through the skin and lungs in the form of carbonic acid and water, as none of it can be found in the fæces or urine. Fat resists the action of the atmosphere on the body, and is a protection to the organs. But the action of the atmosphere does not end with the loss of the fat. Every soluble substance in the body gives up its carbon, until at length all resistance ceases, and death and decay begin, when every part of the body enters into combination with the oxygen of the air. The influence of the atmosphere is the cause of death in most chronic diseases; from want of carbon to resist its action that of the brain and nerves is used. In a normal state of health and nutrition, however, the carbon of the carbonic acid must have another source," and M. Liebig concludes this most interesting paper by promising another, in which he will "endeavour to show that the carbon of such substances as sugar, gum, and starch is used for the purposes of respiration and the production of animal heat; and that the latter is closely connected with the carbon of the food.

On the Solubility of Fibrine and of Coagulated Albumen. By M. **Wöhler.** (*Journal de Pharmacie,* March 1842.)—M. Gmelin many years ago ascertained that coagulated albumen dissolved perfectly in water whose temperature was raised to 200° Cent. MM. Wöhler and J. Vogel have made numerous experiments on the same subject, and ascertained that this solution takes place at 150°. They introduced coagulated albumen into tubes containing a certain quantity of water, closed them hermetically, and boiled them in oil at a temperature of 150° Cent.

The fibrine of the blood as well as muscular fibre boiled in water dissolved in the same manner; their solution was almost complete, little or no residue being left. Copious precipitates were thrown down from these solutions by means of acids; by nitric acid, even when it was very much diluted. The precipitate formed by acetic acid redissolved in an excess of the same.

PATHOLOGY.

Case of Scirrhus of the Pancreas. By Dr **Mollan.** (*Dublin Journal of Medical Science,* March 1832.)—A man, 72 years of age, was admitted in the month of February to the Whitworth Hospital, stating that, for a long time, he had been subject to pain in the stomach after eating, and that within the last six or eight months this pain had become severe, and of frequent occurrence. He was much emaciated, and had tenderness on pressure over the epigastric region, where a tumour was perceptible, which was also felt to the right of the umbilicus. No advantage was derived from any plan of treatment, and he sunk in a few days. About fourteen days before his death he became universally jaundiced, but had no vomiting till within two or three days before his death. He had been of temperate habits. On examining the stomach it was found distended with dark-coloured fluid, and its mucous coat presented marks of increased vascularity. The seat of the tumour was found to be the pancreas, the head of which appeared to be changed into a scirrhous structure. The terminations of the biliary and pancreatic ducts were compressed by it. The gall-bladder and hepatic ducts were greatly distended with bile of a dark green colour. There were several tubercles in the substance of the liver of a white colour and scirrhous structure.

On the Nature and Treatment of Scrofula. By Dr Roesch. (*Haeser's Archiv fur die Gesammte Medicin*, October 1841.)—After enumerating the different forms of scrofulous cachexia, Dr Roesch arrives at the conclusion that scrofulous affections are produced by an excess of acid matters in the fluid of the body. Agreeing with the ancient physicians in his theory of the disease, he recommends their plan of treatment, viz. absorbents, alkalies, and fat or oily matters. He says he has observed that, in those countries where the children get a quantity of lard and other fat matters with their food, that scrofula is extremely rare. Cod-liver oil, is therefore, according to him, one of the most suitable remedies to administer in this disease, seeing it possesses the rare properties of being at once a stimulant, a roborant, an antacid, and nutrient. He considers that the iodine in it will have a very secondary effect, the other properties of the oil being the most valuable.

On a peculiar inflammatory affection of the Cornea in Nurses. By Professor Nasse. (*Ammon's Monatschrift fur Medicin*, November 1841.)—A malignant form of keratitis or inflammation of the cornea occasionally accompanies puerperal attacks, and in general terminates fatally. This affection, however, is not of a malignant nature, and appears at any time during the whole period of nursing, from a month after delivery to a year and a-half, if the child be suckled so long. The eye is felt irritable and the conjunctiva is seen injected with blood. Occasionally the catarrhal symptoms attend the complaint, at other times little vesicles appear over the surface of the conjunctiva. Sometimes rheumatic symptoms are present, at other times it comes on with a vesicular cutaneous eruption over the face. The conjunctival inflammation rapidly passes to the cornea and is accompanied by the usual darting pains in the eye and margin of the orbit. From the third to the eighth day an abscess forms within the layers of the cornea, when the inflammatory symptoms diminish, and, if nothing be done to put an end to the complaint, it bursts into the anterior chamber and occasions hypopion.

The disease is not peculiar to any age, constitution, or season ; but is in every case preceded by great lassitude, debility, and leanness, brought on by excessive lactation, in fact, seems to be a disease of debility. Blood-letting is consequently never indicated, but blisters behind the ears, diaphoretics combined with bitter infusions, quinine and sulphuric acid, a tonic diet, and above all, the giving up suckling the child, generally effect a cure in about three weeks. It is mentioned that the separation of the child is the most important part of the treatment ; and cases are related where the child being allowed to suckle before the cure was completed, brought it back with increased severity, and could not be stopped till the child was again removed, when the disease rapidly gave way.

Communication illustrating the durability of the Vaccine Virus, read before the Edinburgh Medico-Chirurgical Society. By Thomas Graham Weir, M. D.—In the year 1822, my friend, Dr William Scott, was appointed Surgeon to the Honourable East India Company's Ship, the Marchioness of Ely, bound for India, having on board a detachment of the 16th Lancers, and a number of women and children. Small-pox being at this time prevalent in London and its neighbourhood, Dr Scott, (apprehensive that it might break out on board,) requested a supply of vaccine virus from the London National Vaccine Institution.

Four charges preserved in glass tubes, and eight between two pieces of glass, wrapped round with gold-beater's skin, were sent him.

No appearance of small-pox having occurred during this voyage nor during other three made by Dr Scott to the same place, the vaccine virus remained unopened in his sea chest till March 1st 1842. When wishing to ascertain the efficacy of the plan adopted by the National Vaccine Institution for preserving and transporting vaccine virus, he requested me to try it.

In accordance with his wish, on Friday the 25th of March 1824, I vaccinated two children at the Edinburgh New Town Dispensary with the virus contained in the glass tubes.

The plan adopted was the following: The small extremity of each tube having been broken off, the heat of the finger and thumb applied to the bulb was sufficient to expel the enclosed virus, which, being received upon the lancet, was carefully painted in, drawing as little blood as possible.

Friday, the 1st of April, eight days after vaccination, both children returned, when I found four vesicles as perfect as those done with vaccine virus three days old. Upon puncturing the vesicles, I obtained two full charges of vaccine lymph, which I sent to Dr Hue, Registrar to the London National Vaccine Institution, from whom I received the following reply.

"Sir,—I have much pleasure in informing you, that the lymph you was so good as send to us has been tried by order of the Board, and has fully succeeded. I am desired to thank you for your very interesting communication. The fact is highly important and deserves to be made known.—
I am, Sir, C. Hue, *Registrar.*"
Dr G. Weir.

Encouraged by the above success, I tried the lymph preserved between the two pieces of glass.

Three childreen having been brought for vaccination to the Edinburgh New Town Dispensary on Tuesday, the 14th of May, I removed the vaccine lymph from two of the charges, and employed them to make one vesicle on each child, at the same time making in each a second vesicle with fresh vaccine virus. Two returned on Tuesday the 21st of May, when I found in one two vesicles similar in size, and equally full of lymph. In the other, the vesicle formed from the old matter was smaller than that formed from the fresh virus, but quite as perfect, and containing a considerable quantity of vaccine lymph, some of which I employed with perfect success.

Urea secreted in large quantity by the Peritoneum in a case of Ascites. By Dr Corrigan. (*Dublin Journal of Medical Science*, March 1842.)—A woman was attacked with dropsy of the abdominal cavity, for which she was tapped three times. The abdomen again enlarged, and with this she had many symptoms of Bright's disease of the kidney. The most remarkable feature of the case was, that the fluid which was drawn off contained urea in such large quantity, that Professor Kane, to whom the fluid was sent for analysis, could scarcely believe it was not urine.

THERAPEUTICS.

Case of a rare form of Pneumonia. By Dr CORRIGAN. (*Dublin Journal of Medical Science*, March 1842.)—A poor woman, thought to be labouring under pneumonia, was largely blooded, but, as she did not improve, she was taken to the hospital, and put under Dr Corrigan's care. She was then in a very low state; the surface of the body was pale; the extremities cold; the respiration quick but feeble; and the expectoration difficult. The depression was so great, that it was found requisite to continue the use of stimulants till the day of her death. On examination, a portion of the lung was found healthy, but the other portions were diseased, had a deep blue, bordering on purple colour; did not crepitate under the finger, and generally speaking, sank in water. Dr Corrigan regarded the disease to consist of simple congestion of the capillary vessels. There was no effusion of lymph; no tendency to pass into the second stage; no trace of purulent matter anywhere. During life, there had been the usual dulness on percussion; and the ordinary crepitating râle; the chief peculiarity of the symptoms seeming to consist of the marked depression of strength. The congestion, too, seemed to be of a peculiar kind. There was no exudation of serous or bloody fluid; the lung did not pit on pressure, and did not seem so much swelled as in ordinary cases of pneumonia.

A Journey to Gräefenberg, and Observations on the Establishment.—By J. GROSS. (*Hydropathy, or the Cold Water Cure, as practised by Vincent Priessnitz, &c.*)—Notwithstanding the hardness of my bed, I slept profoundly until 4 A. M., when my host came to pack me up to commence my first sudorific process. He made me get up, took away the sheet and a wadded counterpane, which Priessnitz had lent me, (as I was not accustomed to the hot heavy feather-bed which they use here,) and instead of these he spread out a large blanket, on which I laid down naked, he then commenced the usual operation of packing up. Custom had given my host such facility that he wrapped me up so well and so firmly, that I could not move. Over the blanket he put the feather-bed, and then the wadded counterpane, and over all my cloak; these being well tucked in, he finished by burying my head so deep in the pillows, as only to leave the eyes, nose, and mouth uncovered. This covering up of the head is only used when required by the invalid, or by the order of Priessnitz. In leaving me, my attendant wished that perspiration might quickly commence, and he came every now and then to inquire how I was going on. This manner of lying without being able to move, in a woollen blanket, of which the hair is long, causes an uncomfortable sensation on the skin, and was to me a most disagreeable operation, but this was only so for the first time. I went to sleep soon after I was covered up, although it is said this is not good. My temperament being more dry than moist, it was necessary to remain two hours in this position, until the sweat was produced by the concentration of perspiration, and the cutaneous heat manifested itself; with many it requires less time, but this is regulated according to the disposition of the patient. My landlord, seeing I was in a state of perspiration, opened the window, and gave me from time to time, cold water to drink. Both are done in order to refresh the lungs, by causing them to inhale fresh air, to reanimate the strength of the body, and to preserve it from the heat and weakness which ensue. Cold water, drank when the perspiration is running, gives activity to the respiratory functions, whilst if drank before the breaking out of perspiration, it stops it. Another means of promoting perspiration when difficult, is the forced motion of the body, and rubbing of the hands and feet together, as well as this can be done when so tightly wrapped up; only care should be taken not to drink immediately after such motion. After having perspired two hours, and consequently passed four hours in this disagreeable situation, I was delivered from it by Priessnitz, who came in and judged it to be sufficient. We must always leave him to decide the length of the time requisite, and avoid prolonging it until weakness is felt. Its duration varies from half-an-hour to two hours from the moment perspiration commences. My attendant shut the window, freed my head, and quickly took off all my coverings, excepting the blanket, which he sufficiently loosened to enable him to take away the urinal, which had been placed in the bed, and to encase my feet in straw slippers.

At the same time Priessnitz caused me to be seated, and to hold out my hands, which he wetted several times with cold water; when he gave me the basin telling me to wash my face. I then left the bed wrapped in my blanket, covered with perspiration. I went with a quick and gay step, without experiencing the slightest weakness or inconvenience, to the bottom of the staircase, and outside the house to the bath room. Priessnitz preceded me; my landlord followed, carrying the sheet and cloak. After having washed my hands and face, and thrown off the blanket, Priessnitz made me enter the preparatory bath of tepid water, caused me to be washed and well rubbed as on the day previous: I then plunged for an instant into a bath filled with cold water, which comes in continually fresh on the one side, and empties itself on the other, and returned as quick as possible to the former, when after another good rubbing, I was obliged again to go into the cold bath, there to plunge several times, always rubbing my limbs; and again returned for the last time into the tepid bath, which I soon left, covered as the preceding day to regain my room, where I was dried by rubbing: I then quickly dressed and went out to take exercise. Far from shivering, I felt a delightful heat, and a peculiar vigour of body and mind.

I was subjected to the operation of perspiring, but of shorter duration, accompanied by the same bath again in the evening; but the next day, leaving the preparatory bath, on coming out of bed I plunged into the cold bath, taking the precaution, which should never be neglected, of washing hands, face, and neck previously.

MIDWIFERY.

Recovery after Extirpation of the Uterus immediately after Delivery. By M. Rossi. (*Il Raccoglitore Medico*, October 1841.)—A woman of a feeble constitution had a good delivery; the placenta also came away easily.

The midwife who attended her having pushed her hand into the vagina felt a tumour which she mistook for a second child. She accordingly pulled with such force at this tumour, which happened to be the uterus itself, that she tore it from its attachments, and then, by means of a knife, separated it from the vagina and removed it entire. The woman, however, recovered in about thirty days. M. Rossi, who read the history of the case before the medical section of the Congress at Florence, exhibited the uterus which had been thus removed. He was far, however, from thinking that the same success would attend the removal of the entire uterus in cancerous affections of that organ, as, in addition to the real difficulties and dangers of the operation, it was often difficult to tell how far the neighbouring organs were affected, or whether the disease might not return.

TOXICOLOGY.

Symptoms of Poisoning produced by eating the Flesh of an Animal af-

fected with Carbuncle. By M. Costa. (*Annali Universali di Medicina*, October 1841.)—A heifer which had two carbuncles on the buttock was killed and its flesh sold. About sixty persons partook of it, and all were seized with giddiness, tremblings, shiverings, violent cramps in the belly and limbs, vomiting and purging of green bitter matters, intense thirst, sinking of the countenance, delirium, and with a tongue red at the tip but furred at the base. These symptoms were severe in proportion to the quantity of the flesh of which each had partaken. With one exception the whole recovered under the use of simple remedies. In this case the symptoms were the same in their nature as those stated above, but more severe; the prostration of strength rapidly increased, loss of voice, and a soporific state ensued, and the patient died the second day after admission to the hospital. The body was much wasted, and livid spots covered the skin of the body, but especially that of the limbs. The veins of the *dura mater* were filled with blood, and the spinal marrow was somewhat softened. The liver had a tendency to softening, and the spleen was diminished in size. Submucous ecchymosis occupied about two-thirds of the great curvature of the stomach, a similar ecchymosis was observed near the cardiac orifice, and spots of the same appearance were found at intervals over the whole surface of the intestines.

MEDICAL POLICE.

Revaccinations in the Prussian Army for 1840. (*Gazette Medicale de Paris*, 31st July 1841.)—Of 43,522 individuals who were vaccinated 34,573 had well-marked cicatrices, 6177 had imperfect cicatrices, and 2772 had no marks whatever. The progress of revaccination was regular in 20,952, irregular in 8820, and failed in 13,750. In these last, revaccination was repeated, when 2831 took the disease, and 8958 resisted it. True pustules occurred in 20952 individuals; and of this number, 10,021 had from 1 to 5 pustules, 5875 from 6 to 10 pustules, 4171 from 11 to 20 pustules, and 885 from 21 to 30 pustules. Of those who were revaccinated during 1839 and 1840, 7 have been attacked with varicella, 2 with the varioloid eruption, and 1 with true small-pox. During the year 1840, only 74 cases of varioloid eruptions occurred in the Prussian army, of which number 46 were varicella, 21 varioloid, and 7 small-pox. Of these last, 2 died; they had not been revaccinated. These eruptions were chiefly observed in recruits immediately on or shortly after joining the army.

The vaccine matter taken from adults who were revaccinated with success was found as efficacious as that taken from children. The fourth division of the army entirely revaccinated with matter taken from adults, has not had a single case of small-pox for three years, though it has been stationed in countries where that disease was raging.

Revaccinations in the Wurtemberg Army for the last seven years. By Professor Heim. (*Gazette Medicale de Paris*, 31st July 1841.)—During the last seven years, the Wurtemberg army has only had 20 soldiers affected with varioloid eruptions, and two with small-pox, of whom one died. Of these 22 individuals, two only had been revaccinated a few years previous, and it is stated that one had the varioloid eruption when he was revaccinated, and that the revaccination in the other failed. Revaccination was first performed with lymph taken from the child, but afterwards with that from the adults themselves. The following is the result of the seven years experience.

Of 22,780 soldiers, 7888 were revaccinated with success. Of this number, 4814 had distinct cicatrices, 1754 had them scarcely apparent, 1208 had no visible marks, and 112 had had small-pox.

6091 individuals were revaccinated with doubtful success. Of this number 3757 had distinct cicatrices of the former vaccination, 1504 had cicatrices but very indistinct, 569 had no visible marks, and 81 had had small-pox.

8801 were revaccinated without success. Of this number, 5106 had distinct cicatrices, 2353 had indistinct cicatrices, 1188 had no visible marks, and 154 had had small-pox.

From this statement it appears that out of 100 men who were revaccinated, 35 were successfully vaccinated of new, in 26 the success was doubtful, and in 39 it failed. The same statements also demonstrate, that in 1 out of every 8 individuals, no scars of vaccination were apparent,—a number so large that Professor Heim, rather than attribute it to the disease not having been received during infancy, prefers to attribute it to the scars becoming obliterated by age.

Harveian Society.—Notice to Students of Medicine.—The Harveian Society of Edinburgh have fixed on the following subject for their Prize Essay for the year 1843, viz:—

" The Properties of the Urine, and its Morbid States in Various Diseases, unconnected with Granular Degeneration of the Kidney."

Dissertations on this subject must be transmitted to one of the Secretaries, on or before the 1st day of January 1843. Each dissertation must be accompanied by a sealed letter, containing the name and address of the author, and inscribed on the back with a motto. The same motto must also be prefixed to the dissertation to which the letter belongs. None of the sealed letters are ever opened, except that bearing the same motto with the successful essay.

The prize given by the society to the successful candidate, is an elegant silver medal, with a suitable inscription.

The candidate is at liberty to employ his essay afterwards, in any way he may think proper: And, accordingly, some dissertations submitted to the Harveian Society, have, in consequence of publication, conferred no small reputation on the authors.

No candidate, who has already gained the society's prize, is allowed to compete a second time.

By order of the Society.

RICHARD HUIE, M. D., 8 George Square, } *Secretaries.*
P. D. HANDYSIDE, M. D., 24 Duke Street, }
Edinburgh, March, 12 1842.

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PART I.

ORIGINAL COMMUNICATIONS.

ART. I.—*Observations on Tubercular Elephantiasis as it appears in Madeira and Ceylon, and on Leprosy of the Joints as it appears in Ceylon.* By J. KINNIS, M.D., Surgeon to the Forces. (Concluded from p. 27.)

IV.—ON LEPROSY OF THE JOINTS AS IT APPEARS IN CEYLON.

OF fifteen patients labouring under leprosy of the joints in the Lunatic and Leper Hospital, eight are natives of Galle, three of Colombo, one of Caltura, one of Matura, one of Cochin—his parents being Javanese,— and one a Tamul horsekeeper of Trichinopoli. Of the thirteen born in Ceylon, eight are of the Wellale caste, one a Chandoo, or toddy-drawer, one a Moor, one a burgher,—his father being from Holland, his mother a Dutch descendant,—and two of Singhalese mothers, by English and French fathers. Of eleven, in regard to whose relations only memoranda have been kept, one is the reputed father of a patient now in hospital with tubercular elephantiasis, the mother being an hospital cook; another is the son of a patient affected with leprosy of the joints; the mother of a third died of tubercular elephantiasis, and her brother of leprosy of the joints, and the paternal aunt of a fourth died of the same disease. The remaining seven are not aware that any of their relations ever had leprosy in any form.

The disease began in

1 patient at	5 years old, and has now lasted	10, making his present age	15
1	6	24,	30
1	8	32,	40
1	14	32,	46
1	15	10,	25
1	16	34,	50
2 patients at	20	in one, 20,	40
		in the other, 30,	50
1 patient at	25	11,	36
1	31	4,	35
2 patients at	32	in one, 10,	42
		in the other, 18,	50
2	37	in one, 3,	40
		in the other, 13,	50

The first symptom attended to by most of the patients was numbness or insensibility (with or without discoloration) of one hip or of a hip and leg—of the ears and all the parts below the elbow and knee-joints—of the knees and right foot—of the back and arms—of the breast—of the ring and little fingers—or of several distinct parts, with itching, desquamation of cuticle and redness of the arms, ulcers of the hands and feet, and ultimately loss of bones. In three cases the first symptoms were ulcers on the soles of the feet, to which succeeded, after a few years, in one, a white insensible patch on the loins, and smaller patches on different parts of the body—in another, numbness of the ulcerated foot, of the legs and arms in succession; and in the last a white insensible spot on the left breast, with several on the back and other parts, which have now recovered their natural colour, but remain insensible; and he has since lost many of the phalanges of the fingers and toes. In one case the disease began in the left great toe, after it had been bitten by a rat; and in another was preceded by gonorrhœa, bubo, and small sores in different parts of the body, or what the patient calls "Spanish pox."

The hair is in sufficient quantity, and otherwise natural, in all excepting four cases, in which it is rather scanty on the outer half, or on the whole of the eyebrows, the eyelids, part of the beard, or the axillæ; one patient has a clean sore, discharging healthy purulent matter, which began in the form of an abscess, on the right cheek-bone; and in six cases the nose is more or less diseased. One of these has merely tenderness on the right side of the bridge, with some opacity of the right cornea, from ophthalmia during small-pox, and a slightly tuberculated appearance on the back of the tongue; two have a slightly nasal voice, ulceration of the partition, and dilatation of the wings of the nose; the bony part of the partition is destroyed, and the configuration of the soft parts altered in two others, of whom one has also opacity of the right, and staphyloma of the left eye; and in the sixth case, the place of the nose is occupied by an oval opening, through which may be seen all the parts naturally protected and concealed by it.

One patient has some fulness under the nipples; another has these parts rather large and elongated; and a third has them two-thirds of an inch in diameter, and unusually flat and dark-coloured; of a fourth the prepuce is thickly studded with warts, the relaxed scrotum has a flesh-coloured scar on its lowest part, and there is a small benumbed spot, which was formerly of a light colour, below the right shoulder; a fifth has a small tubercle the size of a pea on the right ear, two on the back, and one on the outside of the wrist; but this is the only case in which anything like tubercles of the skin is observed.

The neck, trunk, and greater part of the limbs are generally of their natural appearance, though sometimes, in particular parts, as the elbows and legs, the skin is dry, harsh, shining, or thickened, and often covered with marks of itch. In one case its natural wood-brown colour is marbled with irregular yellowish-brown patches, and the greater part experiences no pain when pricked with a pin; in another, some parts of the surface are sensible and others benumbed, without any deviation from the natural colour; in a third, pale copper-coloured spots on the breast and back, with the greater part of the lower limbs possessing the natural colour, are devoid of sensibility; and in a fourth, of natural coloured, as well as of discoloured parts, some are benumbed or insensible, and others retain their sensibility unimpaired.

The upper and lower limbs, below the elbow and knee-joints, are generally benumbed or insensible; the legs and feet are sometimes tense and swollen; bones or portions of bone have been thrown off, in a few cases from the fore-arms, metacarpus, legs, tarsus, and metatarsus, and in all, with one exception, from the fingers or toes; the stumps being either straight, and their points rounded and swollen, or, as well as the fingers that are entire, permanently bent, and almost deprived of any power of voluntary extension. The shortening of the fingers and toes appears in general to arise from the escape of particular bones or portions of bone through ulcerated openings, of which the scars more frequently than the ulcers themselves are to be seen on the backs or tips of the stumps; but in some cases from interstitial absorption. The nails, irregularly broken, thickened, misshapen, and twisted, often remain attached to the stumps. The varieties of mutilation and deformity that occur in the extreme joints are too numerous to admit of generalization, and will be illustrated by the examples to be given in the next section.

There is more frequently a general fulness than a defined swelling on the upper and inner part of the thighs; yet, in one case, there are three enlarged glands on the left side, about three inches in length; in another a cluster of enlarged glands in each groin, and a small tumour lower down in the usual site; in one or two a distinct swelling on one side, and a fulness on the other; but in most a fulness only on both. A majority of the patients are subject, at irregular periods, to pain and sense of heat in the feet and ankles, more particularly when there are ulcers on these parts, attended by febrile symptoms, and by pain and temporary enlargement of the femoral fulness or swellings.

The size of the testicles is referred to in my notes in nine cases, being natural in six, very small in one, especially on the left side, and rather small in two. One patient, 15 years old, has never experienced sexual desire; another, in whom the disease has existed thirty-four years, has had none during the last two-thirds of that period; a third, who has been affected twenty-four years, has had venereal intercourse since his admission twelve years ago, but not for a long time; and a fourth, who was only attacked three or four years ago, has had no desire since his admission in October 1834. Of six married patients one has four children, the youngest nine months old, but has had no desire nor cohabited with his wife, as he alleges, for the last twelve months; another had a still-born child before the disease began, and left his wife at home when he entered this establishment in 1829; a third has had eight children, six born before and two since the disease began, of whom seven still live, the youngest being ten years old; but he is now without desire, and has been separated from his wife by mutual consent the last eight years; a fourth, who has laboured under the disease twenty years, has a son 10 or 11 years old; but has had no connection with his wife since that son was born; a fifth, having a child of the same age, has not, for five years, cohabited with his wife, who took another husband four months ago; and the sixth, who was attacked with the disease three years ago and has three children, has had no intercourse with his wife since the youngest, now two years old, was born, from an apprehension of injuring her or the offspring to be anticipated therefrom.

The debility and emaciation are generally great, and in one case extreme; the pulse is in several betwixt 80 and 85, and in one intermits about once a minute; in general it exceeds 100, the most frequent being 124. The appetite is good, and the bowels regular in the greater number of cases.

V.—EXAMPLES OF LEPROSY OF THE JOINTS IN DIFFERENT RACES.

CASE I. of above three years duration, Manuel, aged 35, a Chandoo or toddy-drawer, born at Matura.

14th April 1836.—All the fingers of both hands, excepting the index and middle, with portions of skin below the groins, on each knee, and on the inside of the right foot, are benumbed. These parts were once white, and some of them are still of a lighter colour than the rest of the skin. The phalanges of all, excepting the right forefingers, are bent on each other; but none have ever been ulcerated, and the nails are perfect, excepting that of the left little finger, which has been shed, and replaced by another, as yet incomplete. There is a fulness, but no prominent swelling below each groin, and under each nipple; the testicles and penis are of natural size. The disease began in the form of white spots, betwixt three and four years ago, and he has had no sexual desire since his admission in October 1834. He left Matura very young, and knows nothing of his relations.

Case II. of three years' duration, Ganiangodegay Andris, aged 40, a Wellale, born at Galle.

18th April 1836.—The left foot is shortened, and with the lower half of the leg swollen, rough, and in various parts cicatrized. There is a clean superficial sore, an inch in diameter, and surrounded by white thickened cuticle below the inner ankle; another of a very small size, an inch and a-half behind the middle toe, from which two pieces of bone have escaped; and a transverse scar, behind the great and middle toes, marking the point at which the proximal phalanx of the former was thrown off; this toe is much shortened, the others have lost no bones, and, as well as it, have perfect nails; but are smooth, shining, and bent downwards. The right foot and both hands are healthy; the voice slightly nasal; the wings of the nose expanded; on one of them is a small ulcerated tubercle; the partition also is ulcerated, and there is occasional discharge of blood from the nostrils. The outer half of the eyebrows is rather bare; there is a small benumbed spot, which was formerly of a white colour, below the right shoulder; the prepuce is thickly studded with warts; the scrotum very loose, with a flesh-coloured scar, on its lowest part; there is a cluster of swollen glands in each groin; a smaller tumour a little lower down on each thigh, and about once a week he feels feverish, with pain in the right femoral swelling, He has three children, but has not cohabited with his wife since the birth of the youngest, two years ago, from an apprehension of injuring her or the offspring. He is not aware that any of his relations ever had the disease, which in himself began three years ago, after he had been bitten by a rat on the left great toe.

Case III. of ten years' duration, Ranesingha Kangani Appoa, aged about 15, a Wellale, born at Galle.

15th October 1834.—His skin is of a reddish-brown colour, eyes dark-brown, hair black, and in natural quantity; the beard only begins to appear on the upper lip. There are three varieties of insensible parts on his skin, the first consisting of pale copper-coloured patches, varying in size from two inches by half an inch, to six by five inches, below the right nipple, on the right and below the left scapula, betwixt the spinal fossa and the *trochanter major*, and on the front and outside of the left thigh; the second of a pale yellowish-brown spot two and a-half inches by half-an-inch in size on the left cheek; and the third of insensible parts of the natural colour, namely, the lobes of the ears, the outer surface of the right leg, from the head of the fibula to within two or three inches of the ankle, the upper surface of the right foot, the back of the elbow, the ulnar half of the back of the wrist and hand, the backs of the proximal phalanges of the index and middle, with the whole of the ring and little fingers. These parts may be pricked with a needle without inflicting pain, and the insensibility extends a quarter of an inch around the discoloration on the breast. The insensible skin on the right leg is dry, unperspirable, and covered with narrow white filaments of desquamating cuticle; the lines circumscribing its superficial lozenges are anteriorly nearly effaced, and hardly to be distinguished but by their light colour; while behind and above they are transversely waved, inclining a little downwards, and meet at various acute angles to form divisions, from one to two inches in length, and one-fourth to one-sixth of an inch in breadth; these are subdivided into smaller parallelograms by more superficial lines. The hair of this part is of a pale yellowish-brown colour; while the corresponding part of the other leg has a natural appearance, and black hair. There are, again, pale copper-coloured spots, from one-eighth to one inch in diameter over and below the clavicles, on the fore-part and right side of the neck, and over both trochanters, which are perfectly sensible. The two thumbs are of the same length; but the fingers of the right shorter than those of the left hand.

The left forefinger measures in front $2\frac{6}{8}$, the right $2\frac{5}{8}$ inches.
middle - - $3\frac{1}{8}$ - $2\frac{6}{8}$
ring - - $2\frac{6}{8}$ - $2\frac{3}{8}$
little - - $2\frac{4}{8}$ - $1\frac{6}{8}$

The shortening of the right fingers is chiefly in the middle and distal phalanges; the distal phalanx of the little finger is twisted, and the nail faces the side of the body when the palm is directed forwards; when the hand is fully extended, he cannot bring the points of the index and middle, nor of the ring and little fingers, within half an inch of each other; nor are those of the middle and ring fingers in contact, though the distance between them is less. With exception of the ring finger, which has been accidentally burnt, and required a week to get well, none of the fingers have ever been ulcerated. His testicles are of their natural size; but he has never known sexual desire. There is a swelling on the upper and inner part of each thigh, most remarkable on the left side, and consisting of a cluster of enlarged glands, above three inches in length, running obliquely from, and terminating two inches below, the groin. Once a month, once in two or three months, or more rarely, once a fortnight, he has a febrile attack of a day and a-half or two days' duration, occasionally preceded by cold shivering, and terminating by sweating of the face and of the sides under the axillæ, which is attended by slight and temporary increase in the size of the femoral swellings. His general appearance is healthy; pulse 80, intermitting about once a minute; tongue slightly furred; appetite generally good, sometimes impaired; bowels regular. He is an intelligent lad, and has been taught to read a little by his father. He was admitted on the 10th October 1827, the disease having begun three years before, when he was about five years old, with numbness, first of the right ring and little fingers, then of the right leg, left thigh, elbow, breast, and hip. The last of these parts were first observed to be affected, and the ring finger shortened, about a year before his admission; and the shortening of the other fingers followed, without preceding ulceration, or the escape of any portion of bone. He is a Singhalese of the Wellale cast, born at Point de Galle. His father is a patient in hospital, with the same disease, and he has a brother, 10 years old, with discoloured patches on the breast and left cheek; but he does not certainly know that these patches are insensible. His mother, four uncles, and an aunt by the father's side, are alive and well.

Case IV. of 10 years' duration, George M'Cormick, aged 25, the son of an English soldier by a Singhalese woman, born in Colombo.

14th April 1836.—The disease began ten years ago, and was preceded by gonorrhœa, bubo, and small sores, on different parts of the body, or what he calls "Spanish pox." He is reduced to an extreme degree of emaciation and debility. He has a clean ulcer, an inch by half-an-inch in size, discharging healthy purulent matter over the right cheek bone, which was left by an abscess, and has existed only two months—a chain of smaller sores, three or four inches in length, on the back of the right elbow and arm—and permanent flexion, with very inconsiderable power over the motions of the right elbow and left wrist. The fingers and nails are long and slender, and their joints swollen; the left middle, ring and little fingers obliquely bent; the proximal and part of the middle phalanges of the two last united by adhesion; their interspace, and the contiguous surfaces of their middle phalanges, and of the middle and ring fingers, ulcerated. Both knees are half-bent, and he can hardly extend them beyond this position; there are several ulcers on the fore and lower part of the right thigh; and a number of various size, shape, and depth, on the upper surface and sole of the foot; the ankle is swollen and ankylosed; the foot swollen, and bent inwards, with its fore-part downwards; and the second, fourth, and little toes, with part of the middle, have dropped off. The left foot has lost all the toes, is considerably shorter than the right, tapers to a point, and on it and the leg is a considerable number of superficial sores. The condyles of the femurs are hardly less prominent, the hollows between them hardly less deep than in the dry skeleton, and both legs are woefully wasted,—the circumference of the

Right knee-joint being, - -	$12\frac{1}{2}$, of the left	$13\frac{1}{2}$ inches.
leg under the tuberosity of the tibia,	$6\frac{1}{2}$	$7\frac{5}{8}$
leg in the site of the calf, -	$5\frac{1}{8}$	$7\frac{3}{10}$
leg in the middle, - -	$5\frac{4}{10}$	$4\frac{1}{2}$
heel and ankle,	$10\frac{3}{10}$	

He has no very perceptible swellings below the groins; pulse 124, and weak; appetite indifferent; bowels open every second day.

Case V. of 10 years' duration, Thomas, aged 42, a Wellale, born in the district of Galle.

14th April 1836.—The disease began, ten years ago, in the form of a sore, on the sole of the right foot, to which succeeded, some years afterwards, numbness, first of that foot, then of both legs, then of both arms. He was admitted 17th January 1829, and is now bed-ridden. The whole skin is dry, unperspirable, and thickly strewed with itch scars; the fore-arms and hands benumbed; the right ankle ankylosed, and, together with the foot, considerably swollen. He has lost one phalanx of the right fore, one of the right middle, and two of the left fore-finger, one of the left, and both of the right great toe. The nail of the right forefinger envelopes its point on all sides like a cap; the point of the middle finger is swollen and flabby, its nail short and much thickened; the ring and little fingers are bent, and cannot be voluntarily extended. The stump of the left forefinger has a short and narrow nail in front, with its root directed forwards, and point backwards; the nail of the middle is split into two layers, of which one is applied close over the end of the finger, and has a rough outer surface; the other resembles a healthy nail, but shortened, and adhering only one-eighth of an inch from its root. The nail of the left great toe adheres at its root only, and is elongated. On the outside of the right foot there is a large irregular ulcer, three by two inches in size, partly clean and granulating, partly covered with two sloughs, in progress of separation, and, on the upper part of the foot, another small and superficial. He complains of pain from the larger sore, extending up the leg and inside of the thigh to the groin, below which there is a swelling, though neither large nor prominent; has also pain along the inside of the left thigh, but no sore on the foot, nor femoral swelling. The nipples are rather large and elongated; hair of a black colour, intermixed with gray, and in natural quantity on all parts. He had a child before the disease began; but left his wife at home, when he was admitted.

This patient died on the 15th June 1836, and on inspection seventeen hours after death, the body was greatly emaciated, a considerable quantity of serous fluid was found betwixt the membranes and in the ventricles of the brain; the heart was small; the lungs healthy, excepting that the right did not collapse on opening the chest, and the trachea contained a frothy fluid. He had hydrocele of both sides, and the bladder was distended with urine. There were a few round worms in the duodenum; the abdominal viscera were otherwise healthy.

Case VI. of 13 years' duration, Ramen, aged about 50, a Tamul horsekeeper, born in Trinchinopoli.

18th April 1836.—Has been 20 years in Ceylon: the disease began in Colombo 13 years ago: he never had discoloured spots on any part, but has had numbness in the back and arms for the last four years. The thumbs and all the fingers of both hands are greatly mutilated; the right thumb, though hardly an inch in length, retains part of both its bones; the fore, ring, and little fingers have lost the middle and distal phalanges, and the middle finger the middle phalanx: the stumps are mostly in a state of flexion, and have flesh-coloured scars at their extremities or sides]; but the distal phalanx of the middle finger is extended upon the bent proximal, and there is a scar between them in front, from which the middle bone seems to have escaped;—another large scar on the carpal end of the palm; and a third on the outside of the metacarpal bone of the little finger, joining a dry ulcer on its knuckle; the thumb and middle finger only retain fragments of nail, which, in the former, consists of two small firmly adherent scales, one of them only with a root, and in the latter is short, thick, conical, and black. The left thumb, and the distal, middle, and part of the proximal phalanges of all the fingers are gone; there are a dry ulcer on the end of the metacarpal bone of the thumb, scars on the backs and ends of the finger stumps, and on the palm of the hand, one of which, behind the little finger, is ulcerated. There is no remnant of a nail on any of the stumps. None of the bones of the feet or toes have been lost; both legs are swollen, tense, and glistening; on the forepart of the left ankle, and upper of the foot, are many small, red sores, with a larger one on the heel, and two which are foul, and partly covered with thickened cuticle on the sole; the toes are small and irregular in length, and several present flesh-coloured scars; the nail of the great toe bends round its point, the nail of the middle is gone, and of the other toes the nails are short and broken. The second toe of the right foot is the smallest; the great toe is twisted outwards and upwards; there is a large ulcerated scar on the heel; several sores on the lower and outer part of the leg; one on the outer ankle; two on the sole of the foot, and one on the point of the middle toe. There is a diffused swelling in each groin, and before his admission in March last, he was subject at distant intervals to fever, with pain in the feet, legs, and thighs, but has had none for the last five months. Testicles of their natural size. He has a child ten years old; but for five years has not cohabited with his wife, who took another husband four months ago. His father's sister died of the disease. He never heard of any other of his relations being affected.

Case VII. of 20 years' duration, Wittanegany Louis, aged about 40, a Wellale, born in Dangedera, Galle district.

18th April 1836.—The disease appeared twenty years ago, in the form of a sore on the sole of the right foot, which was followed by white insensible patches on the left breast, the left side of the back, and other parts: these have resumed their natural colour, but not their sensibility, and the whole of the lower limbs, from the hips downwards, excepting the inner surface of the left thigh, are also insensible. The fingers of the right hand are mutilated and straight, the stumps rounded and swollen, the proximal and part of the distal phalanx of the thumb have escaped through an ulcer on its back, of which the puckered scar remains, and its nail is thick, short, rough, and black: the proximal phalanges only of the index and middle fingers remain; there are several scars at the point of the former, and one on the back of the latter. This stump was scalded and blistered by boiling water three weeks ago, but he felt no pain. The ring finger has lost its middle and part of its distal bone, through an ulcer on its outer and back surface, which is now cicatrized; but it retains part of the nail. The little finger has lost its distal and part of its middle phalanx, with the nail, the remaining part of the middle being bent upon the proximal. The left thumb and little finger are bent, but entire; the three intermediate fingers have lost their nails; the index has lost two bones; the middle and ring one each, and part of another; and there are scars on the tips of all the stumps. The skin of the legs is thickened, smooth, shining, and the cuticle desquamating; both feet, but more remarkably the right, are shortened and contracted; on the right sole, behind the toes, are three ulcers, and on the outside of the foot, a fourth, from all which pieces of bone have escaped, causing contraction of the metatarsus, and forcing two of the toes upwards from the level of the rest; the middle toe is livid and swollen, the little has lost its nail, and the nails of the others are small, thickened, pointed, or embrace their extremities, like close caps. On the left sole behind the great toe is a soft ulcerated excrescence with a deep central fissure, the probing of which gives no pain, and detects no denuded bone; the anterior half of this toe is red from former ulceration; the nail thickened, short, irregular, and longitudinally furrowed; the middle toe is the smallest and shortest, and so twisted that its short pointed nail looks outward instead of upward; the remaining toes have enlarged extremities and broken nails, the second being also bent downwards. The partition of the nostrils is ulcerated and painful; his voice slightly nasal. He has a distinct swelling below the left, and a fulness below the right groin; and febrile paroxysms at irregular intervals, with pain in the feet and in these swellings. There are red scars on the elbows from sores caused by friction for itch. The testicles are of natural size. He has a son, ten or eleven years old, but has had no connection with his wife since his son's birth. The last piece of bone came away from his feet thirteen, and the last from his hands twelve years ago.

CASE VIII. of 30 years' duration, Adrian, aged about 50, a Wellale, born at Baddegamma, Galle district.

14th April 1836.—The nose is destroyed, and in its place an opening $1\frac{1}{10}$th by $\frac{7}{10}$th of an inch in diameter, through which may be seen invested with their mucous membrane, three of the spongy bones, (the left inferior being lost,) the nasal process of the ethmoid, the back of the pharynx, the floor of the nostrils perforated by two ulcerated holes, which he keeps stopped with adhesive plaster, to make his voice articulate, the concavity of the left maxillary sinus, (its inner wall being destroyed,) and during deglutition the soft palate rising behind the nostrils. The voice is very nasal; the left eye sunk in its socket; and the lower *punctum lachrymale* obliterated; the tears trickle down the face from the left angle of the eye; there is a large smooth scar around the orbit and on the cheek; two on the right cheek, which pass from the outer angle of the eye, and the middle of the nose, and meet beyond the commissure of the lips, and one in the middle of the forehead; the upper lip is hardly large enough to cover the gums; the teeth are exposed; several of the grinders, and one of the upper incisors lost, all the other teeth loose. The skin of the trunk, right arm, and hand appears quite healthy; about two-thirds of the back part of the left ulna are covered by a large irregular scar, the consequence of ulcers, from which several portions of bone have been discharged; the metacarpal bone of the little finger passed out by an oblong ulcer on the back and outside of the hand, which is now cicatrized; and its proximal end is, in consequence, nearly an inch higher than the other knuckles; there are other scars on the back of the hands and wrists. He has an ulcerated cicatrix on the right patella, which is enlarged and painful on motion; also scars on the inner surface of the calf and on the foot. On the fore and upper half of the left tibia, there is a large, irregular, interrupted scar; another on the inner ankle; and others, from which pieces of bone have come away, on the backs of the great and second toes. No femoral swellings; testicles very small, particularly the left; scrotum much contracted, and penis very short. Pulse 80; appetite good; bowels regular. He can assign no cause for the disease, which commenced thirty years ago. He never had any venereal complaint, and there is no appearance of former ulceration on the penis or in the groins.

Case IX. of 32 years' duration, Carolus Serpencher, aged 40, born in Galle, his father being French, his mother Singhalese.

11th April 1836.—The disease began about thirty-two years ago, with numbness of the left hip, the lower limbs below the knees, and the ears. His skin is of a wood-brown colour, marbled with irregular patches of a darker or yellowish-brown, and the sensibility of the greater part, including the ears, though not absolutely lost, is so obtuse that pricking with a pin gives no pain. The hair is black, and in natural quantity on the head, eyebrows, eyelids, axillæ, and pubes. The lower half of the nose has fallen in; the tip is narrow and oval; the free edge of the partition perpendicular instead of horizontal; the nostrils narrow, oblique, and in shape like the Italic *s*; and the wings thin and depressed; the voice is nasal and hoarse; and the nostrils were ulcerated ten years ago, though he has neither purulent discharge nor nasal hæmorrhage now, and is not aware that any pieces of bone have come away. The fingers are attenuated and bent from former ulceration, but retain all their bones and nails. Both the feet are greatly diminished in size; and, betwixt the right heel and inner ankle, is a flesh-coloured tumour, measuring ten inches and a-quarter in its greatest circumference, six and a-quarter at its neck, three and a-half in length, two and three-tenths in breadth, and two and three-quarters in depth, which began six years ago, like a small pimple, has slowly increased in size, is insensible to the point of a pin, but painful when hit against a stone; there is an oval ulcer on its outer side. The length of the right foot is six and one-fifth, the greatest breadth two and a-half inches; the toes are all greatly shortened, but retain their nails; and he says he has lost only one bone from the sole behind the great toe, whose nail closely embraces its extremity on all sides. The left foot is about the same length as the right; its upper surface swollen and painful; there are two sores on the sole, one of them behind the great toe, and from this a piece of bone has been thrown off; but from no other part, though the toes are all shortened, with thickened, irregular, broken nails. The testicles are rather small and the penis short; he has had no venereal desire for the last ten years. There is a general fulness, without any distinct circumscribed swelling, below each groin. He has occasionally pain in the feet, and in this part accompanied by febrile indisposition.

Case X. of 32 years' duration, John Cathyzer, aged 46, born at Galle, his father being a native of Holland, his mother a Dutch descendant of Ceylon.

11th April 1836.—The disease began at Galle in 1804, and he was admitted into the Leper Hospital in July 1810. The skin appears healthy, with exception of a few reddish scars, ascribed to friction for itch. The hair of the eyebrows is almost gone, of the eyelids very thin, of the axillæ short and scanty, of the beard partial, and of the pubes in natural quantity. He has staphyloma of the left eye, and opacity of the right cornea. The nose is long and shapeless, its wings small and thin, and the two nostrils were thrown into one by the loss of their partition, ten or fifteen years ago, previously to which he was subject to nasal hemorrhage, but not since. The skin of the elbows is loose, thickened, smooth, and red, from previous ulceration; the fingers of both hands are bent, and all the terminal phalanges shortened, though he states that pieces of bone have come away from the left thumb and right fore-finger only; the left, fore, and little fingers have lost their nails; the nails of all the others are short, irregular, and thickened; there have been ulcers on all the fingers, but there is only one now, red, granulating, smaller than a pea, on the back of the distal joint of the right thumb. All the toes of the left foot, (excepting the great toe,) and the fourth and little toes of the right foot, are unusually short; from a spot about an inch behind and between the two last, a piece of bone once escaped; there are open sores on the left outer ankle, and on the sole of the right great toe; the three outer toes of the left, with the middle toe of the right foot, have lost their nails, and the sensibility of the lower limbs is very obtuse. There is a slight fulness below each groin, which increases in size and becomes painful, with febrile symptoms, pain and swelling of the feet and ankles once a fortnight, once a month, or every two months. The nipples are flat, of a dark colour, and two-thirds of an inch in diameter; the testicles of their natural size. He has had no sexual desire for the last fifteen or sixteen years. His voice is nasal and hoarse; pulse 84 and weak; tongue clean; appetite good; bowels regular. None of his relations ever had the disease to his knowledge.

Case XI.—Of 34 years duration, Mieden, aged about 50, born at Cochin, of Javanese parents.

10th April 1836.—He enlisted as a boy in the 1st Ceylon regiment, to which his father belonged; but was discharged on account of an ulcer on the left heel, a few days before his admission into the

Leper Hospital in June 1820. Three or four years afterwards a white insensible patch appeared on the loins, and extended to other parts. His colour is yellowish brown. The skin of the whole body, excepting small portions on the back of the neck, lower part of the abdomen, and upper part of the thighs, is now insensible, and may be pricked with a pin without causing pain, nor is there any difference in the colour or appearance of the sensible and insensible parts. There is a small tubercle the size of a pea on the outside of the right wrist, another on the upper part of the right ear, and two on the upper part of the back, one of these last being of a black colour, and to all appearance a mole or nævus; but there are no tubercles on the face or limbs, and the hair of the eyebrows, eyelids, beard, axillæ, and pubes, is in natural quantity. Both hands and both feet are greatly mutilated and deformed. The phalanges of the right thumb and of the little finger are permanently bent to right angles, and their nails short and thick; one of the bones of the fore-finger has escaped from its extremity, yet the nail remains with its point directed to the palmar surface; the middle finger has lost one phalanx with its nail, and the remaining two are bent; the middle and distal phalanges of the ring finger are shortened and contracted in opposite directions, with a thickened, pointed, and hooked nail. The left hand has lost the proximal bone of the thumb; two phalanges of the fore, two of the middle, and one of the ring finger; while the phalanges of the little finger are merely bent, and its narrow, thick, and elongated nail is in contact with its root. The index of this hand is the only stump without a nail; that of the thumb is short, thick, conical, horny, and with the distal phalanx bent upon the metacarpus; of the middle finger small and thick; of the ring finger pointed, hooked, and bent outwards; and of the little finger long, thick, and narrow. The right foot is greatly deformed; the toes are drawn inwards, huddled together, and occupy only half their usual space, the other half being occupied by the outer edge of the foot, drawn inwards and looking forwards, and on this part the foot rests on standing or walking; the heel is rounded and swollen; there is a small ulcer on the fore and outer part of the sole; the whole or the greater part of every metatarsal bone seems to be gone; and the toes are all much shortened, though their distal phalanges with the nails attached remain; the three inner toes have their points and lower surfaces directed inwards and downwards; the two outer slightly outwards. On the sole of the left heel are three small ulcerated holes, and a narrow slit leading into a deep sinus, which may be probed without inflicting the least pain. From these openings, and from the metatarsus, several pieces of bone have passed out; but the toes appear to have lost no complete bone; the terminal phalanx of the great toe is bent, and the nail looks forwards in place of upwards; the second toe is turned obliquely inwards against the outer side of the first; and the middle is shortened by the loss of a piece of bone. He has no feeling in the scrotum or penis, which is short and the testicles small; nor has he experienced sexual desire for the last twenty-four years. There is a fulness but no defined swelling below each groin, and he is subject at irregular intervals to pain in the sores of the feet and in this part, with febrile symptoms. He is the reputed father of a patient now in hospital with tubercular elephantiasis, said to be only 22 years of age, but is not aware that any other of his relations ever had any form of leprosy.

To the foregoing examples, which all occurred in the Lunatic and Leper Hospital of Ceylon, I add one from the Mauritius.

CASE XII.—Of unknown duration, Castor, aged about 25, a Mozambique slave.

Mauritius, 1822.—His skin, of a chestnut brown colour, has a natural appearance on the trunk and inside of the arms and thighs; but, on other parts of the upper and lower limbs, is harsh, dry, thickened, shrivelled, and covered with scars, of which some, on the elbows, right hand, fore and ring fingers, left knee and ankle, with several oblong, elevated whip marks, on the loins and hips, are flesh-coloured. From the right hand he has lost the middle and distal phalanges of the fore, middle, and ring fingers, the distal phalanx of the thumb, and the middle bone of the little finger: from the left hand, the middle and distal phalanges of the middle and ring fingers, the distal of the thumb, and the middle bone of the fore and little fingers. Where the middle bones are wanting, the distal phalanges are permanently bent to right angles, with the proximal, and the bones are reported to have come away from the backs of the fingers; but there is a well-marked cicatrix on one of them only. The extremities of the other stumps are slightly enlarged, and present irregular cicatrized lines, which are drawn nearer to the palmar than the dorsal surface, by the contraction of the flexor muscles. The little fingers have good nails, one or two of the other fingers and the thumbs have small, hard, horny projections instead of them. He has lost all the toes of both feet; and the cicatrized stumps are as smooth and uniform as if they had been removed by surgical operation. On the inner and forepart of the left, the under and fore-part of the right foot, and the end of the right metatarsus, there are several ulcers, which are detected by their offensive discharge, being nearly covered with thickened cuticle. The hair is rather scanty in the axilla and on the beard; in natural quantity on other parts. There is a rough, irregular, circumscribed patch on each side of the root of the tongue, and the uvula and tonsils are small. About three inches below Poupart's ligament, there is an oblong swelling two inches in length and one in breadth, consisting of two enlarged glands on each side. The testicles are rather small, the penis of natural size; he has sometimes but rarely sexual desire. Pulse 112 in the upright, 106 in the sitting posture, and very weak; voice little if at all affected; tongue clean; appetite good; bowels regular. He has been twelve years in the Mauritius, and remembers nothing of his relations. He lost all the toes, and the deficient phalanges of the fingers, at least seven years ago; but can give no other information in regard to the origin and progress of the disease.

An extraordinary case, which fell under my observation in the Mauritius, though referable to neither of the forms of disease here described, may be appended to this paper.

Case of Adonis, a Mozambique slave, probably 18 or 20 years old.

Mauritius, 1822.—His aspect is hideous and appalling; the integuments of the whole face appear to be formed of one enormous cicatrix, which, beginning at the crown of the head, extends obliquely downwards and outwards to about an inch before the right, and three inches before the left ear, and then perpendicularly downwards, to an inch and a-half before the right, and three inches before the left angle of the lower jaw; from this last spot it is continued in an irregular curve, with its convexity downwards to the middle of the lower lip, and from the first it passes downwards and forwards to the symphysis of the chin, then upwards and backwards to the right commissure of the mouth. In the whole of the surface thus bounded, which measures fifteen inches in a perpendicular, and twelve inches in a transverse direction, there is not a vestige of natural skin. The cuticle of the new integument, where it covers the cranium ,is smooth, shining, cracked, and scaly, of a brownish colour, and intersected by a few subordinate pale red scars and a few superficial sores, the largest near the middle of the forehead, two-thirds of an inch in diameter and scabbed over. The cuticle of the face is also smooth and shining, but of a darker colour, and not cracked or scaly. The symmetry of the face is entirely gone. The eyebrows, eyelids, nose, and upper lip, have been destroyed. The left eye is surrounded by a triangular ulcer, which extends an inch and a-half below the outer canthus, covers the superciliary ridge, and is in contact with the sclerotic conjunctiva: this last is of a pale red colour, and seems to encroach on the cornea, which is not more than half its natural diameter, ulcerated and opaque; yet he can discriminate colours, and says he could also distinguish objects were the wind less strong. The right eyeball overgrown, and literally buried in its socket, by new skin. In place of the nose, upper lip, and mouth, there is a triangular aperture, which begins half an inch below the level of the inner angle of the eye, measures two and a-half inches in perpendicular depth, two inches in breadth at its lowest part, or betwixt the angles of the mouth, and only half an inch in breadth from the apex to the upper teeth; its sides are inverted and ulcerated; its base, formed by the lower and only lip, as well as the inside of the mouth and palate, appear to be free from ulceration. The aperture is so contracted that a satisfactory view of the throat cannot be obtained. The left angle of the mouth is considerably below the level of the right; and the left cheek is thickened, and hangs down to near the margin of the lower jaw. The nostrils communicate with each other through their partition, which, with every part of them that can be seen, is ulcerated; the inferior spongy bones are lost; and the openings into the maxillary sinuses exposed. The upper incisor and canine teeth are laid bare; and the lower incisors, though shaded by these and by the lip, can also be seen; one of the upper lateral incisors has dropped out, and the others are irregular. His voice is very indistinct. The ears, the penis, the scrotum, the testicles, and every other external part have their natural appearance. Pulse 100 and weak; tongue rather furred and aphthous on the edges; appetite good; bowels regular. No satisfactory information in regard to the origin and progress of the disease can be obtained. His master states, that, about a year before it began, he attended upon, lived with, and wore the clothes of another slave, in the last stage of secondary syphilis. About six years ago he first complained of his throat, which was found to be ulcerated and the uvula destroyed. Under a French surgeon, he recovered in three months, and continued well two years; at the end of which time he again complained, and two or three days afterwards his nose fell in. It is not alleged that he ever had primary syphilis, and not known whether or not he ever took mercury.[*]

Errata in the July Number.

Page 6, line 12 from the bottom, *for* ⅛ *read* ¼.
——10, — 16 from the top, *for* partitions *read* partition.
——13 — 17 —————after desquamation insert—and the skin.
——19 — 4 from the bottom, *for* longest *read* largest.

Art. II.—*Letter to Sir William Burnett, K. C. H., M. D. F. R. S., Inspector-General of Naval Hospitals and Fleets.* From James Prior, Esq. F. S. A., M. R. I. A., Surgeon of Her Majesty's Yacht William and Mary.

My Dear Sir William,—The fitting out of a line of battle ship, wholly appropriated as an hospital for service on the coast of China, seems in every respect so judicious and humane a measure, that I am happy to give it the tribute of my sincere though humble commendation. I do this the more readily, from having, in a region not very remote from that in question, personally experienced the difficulty of treating extensive and obstinate disease with all the advantages I wished, in a single-decked ship actively employed in general service,—whose deficient resources for meeting the contingencies that continually occur are perhaps unavoidable,—and whose officers looking chiefly, though naturally, to the fighting efficiency of their decks, are unwilling to encumber them, or to appropriate the best situations for the reception of sickness, until driven to the last extremity. A vessel so appropriated in the situation alluded to would have been eminently useful, and, from the nature of the service going on, and the numbers of sick, unfortunately amply occupied. Such remarks as that occasion, and the state of disease suggested, you will doubtless readily receive. I am far from thinking that I have any thing very new or important to say; yet, as being not inapplicable to the operation now going on in the Eastern seas, any thing bearing upon the point of the health and consequent efficiency of large armaments, may not be deemed unnecessary by those whose more especial province it is to guard against the contingencies attendant upon warlike service. A paper of some length on the prevailing malady we had then to contend with, dysentery, was indeed projected many years ago. The accidental loss, however, of some materials connected with it, and having commenced more extensive literary works involving much general reading and inquiry, and consequent occupation of time, added to the conviction that it had been very ably and satisfactorily investigated by two distinguished members of our service—Dr James Johnson and Mr Bampfield, deterred me from attempting to do inadequately what was already so well performed. To their volumes, particularly the former, the practitioners in the tropics must often recur. And though modes of practice may differ, since, in order to be effectual, I am disposed to think they should differ in different localities and under different circumstances,—valuable suggestions are to be gleaned from both. My own practice was unbiassed by the opinions of either, for their works had not then appeared. I write now chiefly from recollection, which is, however, pretty vivid, of what I saw and experienced; but it is not my intention, nor is the present communication the place, to enter much into detail.

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[*] May not this be an example in a different island, of the *Ara mauny wenny* of the Singhalese?—"a wide-spreading ulceration of the skin," which "occasionally commits great ravages on the face," and which, as "seen in a number of Kandyans," is concisely described by my friend, Deputy Inspector-General Marshall, in his "Notes on the Medical Topography of the Interior of Ceylon," pp. 41, 42.

Judging from the newspapers, which form the only source of my information on this occasion, the chief disease at Chusan and its vicinity is that already mentioned, and to it I shall confine myself. Fever simply, on a large scale, and of peculiarly malignant character, I did not see; for what occurred on board differed in no material point from the typhus of Europe. But from what came under my observation, and by what I could learn from the reports of the medical officers of the India squadron who had been longer in the country, dysentery was beyond doubt the more general, as well as destructive malady of the climate. Cholera had not then shown itself in the malignant form it has since assumed.

On the reduction of Mauritius in November 1810, the Nisus, in which I was embarked, having quitted England in her the previous June, remained at anchor in Port Louis for about three months. During much of this period about a third of the crew (that is above 100 men) were employed in various duties in the naval arsenal, and found means, in which you know they are not a little ingenious, of procuring access to spirituous liquors. Little, indeed, could be detected of absolute drunkenness, which was sharply and undeviatingly punished; but I had sufficient evidence in what transpired occasionally, added to the number of bowel complaints, of their indulgence, notwithstanding every vigilance in the prohibited gratification. And this unfortunate propensity of our soldiers and sailors forms the leading evil which the medical officers as well as the officers in command have to meet, and if possible to avert.[*]

The cases of cholera (in its European, not Asiatic character,) diarrhœa, and dysentery, amounted during this time to about sixty or more; the majority slight or of favourable character; while others presented every degree of severity. At first diarrhœa prevailed; this, if not speedily checked, put on the dysenteric character; and after the lapse of some further time the great majority of new cases that presented themselves assumed at once the form of decided dysentery. The degree of pyrexia was not great; the mind little if at all disturbed; and nothing could be traced of a contagious character. The tormina, tenesmus, borborygmi, dejections of blood in some cases, of watery or slimy matters, of mucus, or of mucus and blood in others, a troublesome degree of dysuria, pain about the umbilicus, and the consequent exhaustion, were, however, very distressing. Our loss, indeed, was small; one on board where they were nearly all treated, and two at the hospital. Two out of the three were addicted to drinking; the third was an elderly man, a foreigner, serving as a marine; and I may here remark that the more advanced in life, and the weak in frame, were especially open to the disease, and if not fatal to them, it was more prone to run into the chronic state than with those who were stronger or younger.

The indications I kept in view in the treatment were, in the first place, to remove probable offending matters in the *primæ viæ*, in case there had been no previous diarrhœa of much moment,—to promote the excretions of the skin and kidneys,—to obviate spasm of the intestines, (the most distressing symptom to the patient)—and to defend their mucous surfaces. The smallness of our loss I attributed to the prompt use of considerable doses of opium with a proportion of calomel not immoderate for a tropical region, namely, three grains of the former to seven of the latter; given commonly twice within the twenty-four hours according to the urgency of symptoms. So successful was this form of remedy in abating pain and spasm, and, in fact, all the most dangerous and pressing features of the complaint, that for a time I flattered myself with its being almost a specific when employed early, conjoined with great care on the part of the patient, strict confinement to his hammock, mucilaginous drinks, and an occasional enema to soothe and sheathe the rectum. If in five or six days no good effects were produced, and failure now and then took place as may be supposed, it was discontinued, finding further perseverance in those proportions do no good. But commonly the disease was so subdued or modified in that time, that the completion of the cure was left to nursing, diet, occasionally a little *Pulv. Ipecac. c.;* or *Ol. Ricini*, with in all cases never less than twenty or thirty drops of *T. Opii*, as circumstances seemed to require. Where failure occurred I sometimes omitted giving either ingredient of the remedy for a time, returning to them as I judged expedient in diminished doses, and substituting in lieu of calomel the *Pilul. Hydrarg.* with two or three grains of *Pulv. Rhei.*

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[*] An amusing instance of the unwillingness of this class to admit the ill effects of their favourite habits, occurred to me a few days ago. A fine young seaman presented himself for examination preparatory to entering on board a vessel fitting out here, when, after a few questions, I found he had came recently from China in the Conway. He had suffered there from dysentery for about a week or ten days, but, as was obvious from his appearance, had long perfectly recovered. I inquired to what he attributed his own and the general illness at Chusan? "To the water, Sir." "And something to the quality of the grog, I suppose?" "Why no, Sir, (smiling) the grog was not bad." "Tell me candidly did you drink much of it?" "Not a great deal, Sir, I assure you." "Yet I cannot but think the *Shamsoo* had something to do with it." "Why, Sir, I should think not, for the Royal Irish drank like devils and they got off pretty well; while the Cameronians did not take so much, and they died very fast."

In attempting to form an opinion of the immediately exciting causes of the complaint, I was led to believe, from the characters of the respective patients, and such other circumstances as bore upon the point, that out of ten cases, six might be fairly attributed to irregularities in food or drink; the remainder to exposure to the commonly understood influences of climate, such as heat, moisture, exhaustion, or other endemic causes. In corroboration of this it may be observed that none of the officers excepting myself suffered from it; and this attack I firmly believed and still believe, arose not from any contagious or infectious tendency in the disease, but from a slight deviation on my own part in the *ingesta*, or at least I was satisfied that a very slight irregularity in the latter was sufficient to reproduce it where a predisposition to the complaint existed. Previous to the reduction of the island I had experienced something of this in a slight attack in consequence of exposure one night in the boats when detached from the ship on service; but the crew had not then been attacked by it, and consequently there could be no ground for the belief of contagion. On the other occasion, to which more particular allusion is intended in proof of what slight causes frequently deranged the customary functions of the *primæ viæ*, I had dined with the chief of the Bengal Medical Staff, and partaken very moderately in the pleasures of the table, but was induced to mingle with the wine two or three glasses of claret, the use of which I had relinquished for the previous two or three months. On the following night, having put to sea in the morning to cruize off the island, I was attacked pretty severely. My assistant being left behind doing duty at the military hospital in Port Louis, I was visited by the surgeon of the Phœbe, our consort in the cruize, the following and some other days; but, having perfect confidence in my own plan of treatment, I adopted it strictly, and in a week or ten days was convalescent. The severer symptoms were not of more than five or six days continuance, though leaving behind much general debility, and an irritability of the intestines that became extremely troublesome from very slight causes on subsequent occasions. The calls to stool during the attack were about twelve or fourteen times during the twenty-four hours; frequently a sharp spasm about the umbilicus; fulness about the cæcum; severe tenesmus; urine scanty; little or no pain on pressing the abdomen; dejections chiefly of blood and mucus; pulse commonly about 92; not the slightest affection of the sensorium at any time.

One of the most unpleasant effects of the remedy, or of the disease, (for both participated in the odium), upon myself, as well as upon others of the less robust order of frames, was the generation of flatus in the stomach to an extraordinary and most inconvenient degree, producing extreme distension of that viscus, and constriction about the superior portion of the œsophagus, so as to interfere, in some measure, with free deglutition; and there was much difficulty in dispersing it. The means used with this view were chiefly a combination of rhubarb, ginger, and cayenne pepper, in small proportions, given three or four times a day. I have since seen (and unhappily experienced) something of the same kind continue for days in attacks of highly aggravated dyspepsia. Distension from flatus, it is well known to every practitioner, is common in dysentery; but the opium I thought increased it. No other peculiar effect resulted from its use in the doses specified; and I may add that I was led to their adoption, as well as the proportion of calomel, by having, on two or three previous occasions, employed them in Europe with the best effects after the use of mild evacuants, where there existed severe spasms in the intestines, with a tendency to subacute inflammation; and as these seemed to me to be marked features in this disease, I thought the analogy sufficiently strong to warrant my having recourse to the same treatment. I was aware of its having been treated in India by much larger doses of calomel, though little on the subject had been then (1810) published, or at least fallen into my hands; and from that plan when tried, for I did make some trials of it, I saw much less advantage than from my own.

A run to the Seychelle Islands, thence to Madras, and the return voyage, improved our state of health. But a portion of the Cape of Good Hope squadron being ordered to follow its Commander-in-chief (Admiral Sir Robert Stopford) to join the expedition from India against Java, we sailed from Mauritius for that destination, in company with two other frigates, President and

Phœbe, about a week after our arrival in Port Louis. Crossing the Indian Ocean to run down the north-west coast of New Holland, the temperature decreased considerably, one of the effects of which was our encountering for a few days a current of atmosphere, often experienced at sea, giving origin to epidemic catarrh or influenza, though happily proving on this occasion of modified character.

It occupied just seven weeks to reach the Bay of Batavia. At this anchorage; at Cheribon, situated on the northern shore of the island; off Samarang; and at the entrance of the channel leading to Sourabaza near its eastern extremity, we spent six weeks more ere the reduction of the island was completed. From a concise memorandum still preserved, I find our sick list during that time numbered 138, including, besides our own crew, of above 300 in number, supernumeraries, chiefly marines, from other vessels, embarked to join the operations on shore. Of the whole number sick, 51 are noted as having had dysentery, of whom five died, 23 fever, of whom two died; and two deaths from phthisis; which, being of some standing, cannot be put down fairly to the account of Java. The other diseases were diarrhœa, 17; pneumonic inflammation, 6; hepatitis, 5; minor complaints, 34. None of these proved fatal, though some were severe.

The extent of the sick list is to be accounted for by the very active service seen by our men. At Batavia the marines were disembarked without delay, and took their turn in the batteries and works before the enemy's entrenched camp of Cornelis. At Cheribon they were again sent on shore with above 100 seamen, part of the latter garrisoning the fort and works, while the remainder joined the marines in a forced march to the interior, in pursuit of a portion of the enemy's force said to have carried off the military chest, and some waggons of copper money. At Sausarang the boats were a good deal detached from the ship at night. At Sourabaza the marines and seamen were again landed, though without making any material stay on shore, from there being no resistance offered. In all these places the seamen were much in the boats, and their exposure unavoidably great on a shore proverbially unhealthy. The excitement caused by the very animating operations in which they were engaged, tended, no doubt, to ward off a still greater degree of disease than actually prevailed, and we were not there sufficiently long to permit this feeling to subside. Even on putting to sea in finally quitting the shores of Java, in pursuit of two French frigates, which had escaped from Sourabaza roads, and beaten off the Bucephalus, and in the passage thence through the straits of Sunda to Mauritius, and afterwards to the Cape, there was still before us the stimulus of a probable hostile encounter with them. It is a curious fact in illustration of this, that, among the marines, who had by far the greater share of fatigue and exposure on shore in the heaviest, yet most exciting work, no deaths occurred. One fatal case among the seamen had been stationed in Cheribon fort, the quarters of which were in so filthy a state that our men on first entering them were obliged precipitately to retire, being seized with nausea and headach; and, in fact, the scourge of pestilence which this neglect must have promoted, raged here a few years ago, and carried off many hundreds. Another seaman had belonged to a boat. But the march into the interior, in which marines and seamen, particularly the former, from the greater weight of their arms and accoutrements, suffered as severely for a short time, as it is possible to conceive, from sheer exhaustion, bleeding freely from the nose and ears, occasioned no deaths, and added only two seriously ill to the sick list.

The dysenteric attacks among our crew presented every shade of variety; many comparatively slight; others of the most serious kind, and running their course rapidly. Between several of the former, and those I marked as diarrhœa, the line of demarcation, it must be confessed, was not always very obvious; for the majority of the latter were attended by a greater or less degree of fever, and might perhaps be strictly classed as dysentery in its simplest form. Nature and the nosologists will often clash. Nice shades of distinction in these, as in other maladies, will be sometimes drawn by writers in the closet, which those who work laboriously by the bedside of patients in various and distant climates, and even in many localities nearer home, soon perceive can be traced with difficulty, or not at all. The degree of pyrexia was greater generally than at Mauritius; yet the mind continued commonly unclouded, even when life drew near to a close; an instance of which may be adduced. I was suddenly summoned by the report of increased danger to a young man who had been ill only a few days, and found that, having quitted his hammock during the momentary absence of the attendant, he could not be persuaded to be replaced in it. In reply to my remonstrances on the disadvantage to himself on continuing on the deck, he begged to be permitted to remain a short time longer, and then, fixing himself on his knees, commenced praying most fervently, which indeed proved to be the chief motive for quitting his bed; evincing in this posture, as he believed, more reverence towards God when upon the point of entering into his presence. On concluding this solemn and impressive duty, which was not till after many minutes, with more strength than I thought he possessed, he was removed to his hammock without repugnance; and, notwithstanding the seeming vigour indicated by the exertion he had made, expired in less than half an hour.

As a contrast to this, the tenacity of the *vis vitæ*, in another instance where appearances indicated that its hold upon the corporeal tenement had ceased, was not less striking. A drummer of marines (an adult), whose life I took credit to myself for having saved more than once when in imminent jeopardy from the disease, at length displayed several of the usual preliminary symptoms of death, and seemed to have departed. So unequivocal did this appear, that I had intimated his approaching, if not actual dissolution, when, having returned to the almost lifeless body, as if loth finally to quit what had cost me so much trouble on previous occasions to preserve, I thought I perceived slight indications of the process of respiration still going on. Volatile stimulants, hot water to the feet, gentle friction, wine, &c. were used, the pulse returned, and he ultimately recovered so far as to be sent home. Two of the deaths, in fact, were from sheer exhaustion, the disease having ceased for some time. In other cases not fatal, the debility was so extreme for two or three weeks, that they might be said rather to exist than to live, and were perhaps only saved by supplies of nourishing food and wine from our and the captain's tables; sources which, in most of our ships when at sea, by this gratuitous aid, saved the lives of many seamen during the war.

Relapses were not unfrequent among the more weakly; yet of less fatal character than such attacks generally prove. Among these I was one; for which perhaps there were sufficient causes. On the storming of the enemy's position at Cornelis, 26th August 1811, the medical officers of the fleet were ordered on shore to assist in rendering aid to the wounded, and, having no place appropriated for their reception, had to find food and shelter for the night as they best could in the bustle and confusion succeeding an assault, and where accommodation could not of course be purchased. My first night was therefore passed on what sailors term "the softest plank I could find," under an open shade, with some medical officers of the Bengal army. Next day, finding there was sufficient assistance at the General Hospital at Weltevreeden, I and the surgeon of the Modeste were requested by General Wetherell and the lamented Colonal Gibbs (who fell a General Officer at New Orleans, and to whom I was personally known,) to proceed to the little fort of Cornelis, near the centre of the enemy's late position, where several of our men, as well as prisoners, required prompt professional attendance. There I was actively engaged for some days with several amputations, and other serious surgical duties,—sleeping at night in an open verandah, selected as the only cleanly spot he could find by the assistant surgeon of a Bengal volunteer batallion, which had in the meantime returned from pursuit of the enemy, and the officers taken possession of the same quarters shortly after our arrival. At Cheribon I volunteered with the marines and seamen for the forced march already alluded to.

A second relapse there also was not matter for surprise, considering the unavoidable exposure incident to a life to which neither the men nor myself had been accustomed, and for which, from its temporary nature, but slight provision could be made. On some future occasions, particularly when subjected to exposure, I experienced discomfort from morbid irritability of the intestinal canal, yet fortunately without such serious symptoms as to disqualify me for duty.

In the Nisus, the degree of sickness and mortality was, with one exception, much less than in any other vessel of the large fleet engaged in the expedition. This exception was the President, one of our consort frigates on the voyage thither, which, as she had come under our orders, remained with us during our stay, and likewise departed in company with us on our return. She lost two or three less than we did. The Phœbe, our other consort, on the contrary, lost more; so did the remaining Cape cruizers, the Scipion 74, Admiral Stopford's flag-ship, and the Harpy brig, each in their proportions. The Indian squadron, particularly such ships as had been longest from England, were seriously impaired in efficiency by the disease. Commodore Broughton, its then Commander-in-Chief, when attending a court-martial on board the Nisus in Batavia roads, told me that his ship, the Illustrious, has been nearly ever since her arrival in India little better than an hospital ship; that medical skill, care or variation of treatment, or such changes in her interior regulation and discipline as were supposed to be advantageous, had not really diminished her large sick-list; that she appeared to be in his own phrase "saturated with disease." The Lion 64, which joined the expedition after us from the Malabar coast, also suffered much. Among the frigates, the Leda, Cornelia, Bucephalus, and Hussar, were said to be the worst, though all were sickly. At Banda, the Piedmontaise and Phœnix were represented as having been nearly unmanned by sickness.

The general prophylactic means employed on board differed little from such as are customary in a well-regulated man-of-war. Our discipline was of the strictest description; as much cleanliness and ventilation as possible, without running into the other extreme of too frequently washing the decks; as little laborious duty in boats as possible; an allowance of wine to their crews when obliged to quit their ships early in the morning; the cessation of work in the heat of the day when it could be avoided; and strict orders rigidly enforced against sleeping exposed to night dews, which the heat below induces men to do if not prevented by positive orders. The propriety of that arrangement in hot climates is, however, questioned by many old residents, and in various places the practice of the natives is no doubt the reverse. Much, I imagine, must depend upon the locality; and they alone who inhabit it are necessarily judges of the effects. A point in which we differed from most other ships was in cleaning the lower deck,—where the crew, in cold climates, eat, sleep, and, in fact, wholly live immediately after breakfast, and allowing no person to remain there for the remainder of the day, till the time arrived for again retiring to their hammocks. By adopting this plan whenever the weather permitted, the air of the sleeping-deck was kept more cool and pure for the night. Refreshments of fresh meat and vegetables were of course procured whenever circumstances rendered it practicable.

In the medical treatment, my chief dependence for cutting short the complaint was the same as at Mauritius. I did not find it, however, so successful on the whole as it had been there, though I discovered nothing else so good; and it was something to encounter such an enemy with even a probability of advantage. I found it most prudent to loose little time by premising *Ol. Ricini*, or any other of the milder evacuants, excepting where they seemed absolutely requisite, but on the first symptom of complaint, when the patient was wise enough to give me the opportunity, at once to administer the remedy. Twice within the twenty-four hours I have already said was the maximum of its use. In this I may have erred, as there was no apparent objection in the consequences produced why it should not have been given thrice, or even conjoined with careful watching oftener. But the apprehension of accident, or some idiosyncrasy producing unexpected and unfavourable effects, by the too frequent exhibition of doses of opium larger than ordinary, deterred me from carrying it further. The experiment may be worth trying where we find the mortality, as lately at Chusan, so truly dreadful. I saw nothing to justify having recourse to general blood-letting. The general experience of the Islands I visited, in answer to inquiries on the subject, was against the practice. But, as it is difficult to believe that local inflammation is not going on in some degree where abdominal pain exists more fixed or more acute than ordinary, I should have applied leeches, without hesitation, in many cases, had those useful adjuncts to medical practice been at hand.

The same caution, or, if you will, timidity, which restrained me in venesection, prevented the external application of cold water, though the whim of a patient furnished, perhaps, a sufficient apology for the trial of that remedy to a very fearless practitioner. An officer of marines of the Lion, who was for a time embarked with us on service, complained of illness on our return to Cheribon, from the march I have mentioned, and consulted me on the propriety of having a cold bath, to which he had taken a sudden fancy. I explained to him its doubtful results; that, in all probability, if it did not cure, it might aggravate the symptoms, or endanger his life. Having, however, been brought up himself to the medical profession, though, as may be supposed, long out of its practice, he decided on indulging his humour without attempting to reason on the matter, and, as it turned out, with the happiest results. I had him removed from the bath (not the cold affusion, which, had I sanctioned the plan at all, I should have recommended), to bed immediately, took him on board next morning, and he was soon well,—not a little proud of the success of his own prescription. In this instance, however, the affection was more febrile than dysenteric, the bowels being but slightly touched; both symptoms were recent, originating, as I conceived, in fatigue occasioned by marching all the previous night and the better part of the day in the evening of which the remedy was used. In decided dysentery, therefore, this case, however gratifying to my friend, formed no safe guide to follow. I tried it, however, in two instances, but saw no sufficient good effects to induce me to persevere.

When the disease was not subdued in the first instance, and the patient survived the attack three weeks or a month, it might then be considered fixed in the chronic stage, still distressing and dangerous, or ready from very slight causes to become so. This was a sad state for practitioner and patient. Nothing, indeed, could be more thoroughly unpromising; for though life by good nursing, care, and attentive watching, might be preserved, a cure under such circumstances was nearly hopeless. Medicine, in fact, seemed to have lost their usual curative or ameliorating influences on the frame; and our general conclusion was, that, of all complaints the most intractable, was the chronic dysentery of the tropics. Sea air, though so salubrious in other maladies, could not cure this. Nor were the fine climate of the Cape of Good Hope, when we reached it, the comforts of a good hospital, and the skill of its surgeon, more successful; for he told me that in every instance such cases were obliged to be sent home. And it may be confidently pronounced that any one who has laboured two months under the disease, even when life is not in immediate danger, will not recover in the climate where it originated, but he should be sent to England by the first conveyance. This rule applies more forcibly to the men than to the officers, their privations and exposure being necessarily greater.

It is true that persons by care live for years even in this climate, suffering under a certain degree of the chronic malady, and still preserve life though preserving it miserably. The nature of our mission to Java, and the shortness of our stay, prevented me, as may be supposed, having much intercourse with the inhabitants. Accident, however, threw five such instances in my way; two at Batavia, one the occupier of a kind of hotel where we stopped on a casual visit, and his next door neighbour; two at Cheribon, one of them in office under the president, the other in mercantile employment; and the President Mynheer Swalue, at Karaug Sambung, the village to which the pursuit of the military chest had led us. These persons had not only suffered a good deal but suffered many years; distressed, perhaps, for one, two, or three days within the week or fortnight, and the remainder of the time enjoying an interval of something like exemption and comfort from the more violent symptoms. On inquiring of Mynheer Swalue, very inconsiderately perhaps, why he did not quit so deplorable a climate where life was so precariously retained, he very promptly replied, as, in fact, I had been previously answered in Batavia, "whither was he to go?—He had quitted Holland about eleven years before and not then a youth; no one there now knew or cared for him; his property and connections were in Java, and there he must continue as long as it pleased Providence to permit him." Civilians, therefore, may exist in such a state of suffering; but it is different with the military classes, whose services being of various and migratory character, they cannot necessarily enjoy that quietude and exemption from privation and exposure which are within the reach of others.

Among the remedies employed in the secondary stage, my chief dependence was upon ipecacuanha. It was used in various proportions, and as variously combined as the customary supplies of a frigate permitted, in addition to the *Pulv. Ipecac. comp.* of the Pharmacopœia. Also on several occasions *Pil. Hydrarg.* with *Pulv. Rhei* in small proportions; *Ol. Ricini* and *T. Opii* similarly used; *Conf. Aromat;* and *Conf. Opii* in combination; astringents generally; the antacid earths; camphor variously combined; the mineral acids in *Infus. Lini* or some similar vehicle; *Zinc Sulphat.* in small doses administered in like manner; mucilaginous drinks generally; enemas variously constituted; fomentations; pediluvium; swathing the abdomen in flannel. The warm bath I did not use, or at least to any extent, from the difficulty of procuring it frequently in a ship where no express provision is made for the purpose; but I saw no reason to prize its remedial powers highly. In many instances, to soothe and moderate the most distressing symptoms, was nearly all that could be accomplished, which our advance from the Straits of Sunda to the higher latitudes of the Cape, tended obviously to aid. Experience, as already hinted, forced the conviction upon me, that a permanent cure from this stage was rarely to be expected on the spot. My chief aim, therefore, became latterly to support the system by the most soothing and nourishing means within reach, in order to gain time and give the patient a chance for recovery at home; and, with the disadvantage and discomfort inseparable from a certain degree of exposure of the persons in the customary calls of such a malady on the main deck of a frigate actively engaged in warlike operations, to be enabled to prolong life on any terms, was in some measure a triumph.

I attributed much benefit to an early and strict confinement to bed. This may seem a very superfluous recommendation to such as are chiefly conversant with civil life, or hospital practice; but it is not so at sea. The men, unless violently attacked at first, are often loth to undergo this restraint, added to the irksomeness of quitting their hammocks to answer the frequent calls to stool. Officers in command are likewise disinclined to it, unless where pronounced imperatively necessary on account of encumbering the fighting deck; while some are so intent on preserving the array of guns clear to the eye, as to permit only the vicinity of that noisy, and smoky, and therefore improper place, the galley, to be appropriated for their reception. Against the wishes of both it is frequently the duty of the naval medical officer to contend. But where, from one or other cause, the injunction was for a day or two evaded in part, or wholly neglected, I commonly observed aggravation of symptoms. An early application for medical aid was likewise of essential importance.

I had no opportunity of trying the effects of locating the sick and convalescents upon one of those uninhabited islets which stud the sea so abundantly in the vicinity of the larger Eastern islands; nor did I hear that any one else had attempted it. But the experiment may not be useless and should be made. The only objection is, that it may impair the efficiency of the vessel for a time by the numbers required on shore to superintend, wait upon, and guard the invalids. In the older voyagers we read of its frequent success in scurvy and fever, as well as in many minor complaints; and there is an unquestionable exhilaration to body and mind in treading the earth, or even in the eye reposing on its verdure and productions, after long confinement, and more especially sick confinement on ship-board. I confess I am not at all sanguine in its curative powers in dysentery; but it may prove a useful palliative. On the coast of China the plan will probably be adopted. Officers are naturally reluctant to part with their men by sending them at once to England, so long as a hope of recovery remains, on account of the difficulty of replacing them by others. The medical officer must necessarily consult this feeling as far as prudence warrants and life is not endangered; but his acquiescence should go no further; for it appears that, out of about 70 invalids sent home in the Conway recently, 22 died on the passage. Should the experiment, therefore, not succeed, it will serve to prove to those in command how necessary change of climate is, and still more how indispensable time is to the progress of recovery; for where the disease is of any standing it is in vain to hope that it can be speedy. Much may depend upon the spot so chosen, which obviously should be as remote as circumstances permit, from any vicinity where the complaint is prevalent. And I have mentioned an uninhabited islet from the conviction that it should be wholly interdicted to all, shipmates or natives, who are not in the immediate care or superintendence of the sick, to prevent the introduction of what may, from interested motives or mistaken kindness, mar the effects of medical treatment.

The possession of superior comforts and accommodation, added to greater care on their own parts, rendered the mortality much less in proportion among the officers than men. Not that they wholly escaped. An assistant surgeon on the medical staff of the Indian army, next to whom I had slept during my first night on shore in Java, was seized the following morning with dysentery, and expired in three days. The captain of marines of the Illustrious shared a similar fate, a victim to a high sense of duty; for he had laboured under the chronic disease at Mauritius, but would not there, or at Java, remain on board when his men were fighting on shore. The surgeon of Admiral Stopford's flag ship likewise died; as did the assistant-surgeon of the President, who accompanied me on the march from Cheribon. These came immediately under my observation. Among others, one of the first of whom I heard, and who was lamented with all the warmth due to a man of genius, was John Leyden, known for his general as well as poetical talents, the friend of Sir Walter Scott, and who had accompanied Lord Minto with the expedition from India. The reports received from our military friends in sepoy as well as in European regiments, spoke of serious losses; the former, I believe more than the latter; for, on our first visit to the city of Batavia, we met with more than a dozen human bodies floating down the river on the way to the sea—a common mode of disposing of their dead by Hindoos—while several had lodged near the banks, and were before our eyes in progress of being devoured by dogs and alligators. If this scene of one day formed any criterion of that of another, and our boats reported such to be the case, the mortality must necessarily have been considerable. I had no opportunity, however, of becoming acquainted with details. But, in reply to my inquiries many months afterwards at the Cape of Good Hope by military officers on their way to England, the statement was, that cases, whether of sick or wounded, in the general hospital at Weltevreeden had not turned out well. Many of the amputations died from trismus; others, and those the greater part, from dysentery.

I have already adverted to the absolute necessity of time as well as native climate for a cure when it has once passed into the chronic state. The period required for this purpose will of course vary in different persons according to age and physical powers, which obviously influence its duration very much, but the term generally is not short. Accuracy on this point is, indeed, not to be expected. It is rarely possible to trace the medical history of men in the condition of soldiers and sailors, who, always careless or imprudent in their habits, give nature perhaps, under any circumstances, little chance of repairing the inroads of disease, and who, becoming partially better or tired of the restraints of an hospital, obtain their discharge as unserviceable, and afterwards shift for themselves so as to be out of the reach of inquiry. From what accident has thrown in my way, indeed, added to the account of some officers themselves, sufferers from the complaint, it is certain that two, three, four, and even more years, may elapse, under the most favourable circumstances, before a cure is accomplished. One of these, an acquaintance, a captain in the navy, whose first attack came on, if I remember accurately, after quitting Java, had been two years in England under medical advice without experiencing material amendment when I first saw him. In two years more we met again; he was then better, and soon afterwards, as I heard from his friends, wholly recovered; a blessing which he considered to be owing to the use of De Velno's vegetable syrup, recommended to him by some professional friend resident in (I think) Dublin. If the composition of this nostrum embraces, as is supposed in Paris's Pharmacologia, *Taraxacum* (among other vegetable substances), and the *Hydrargyri Bichloridum*, we may admit that the remedy, in addition to time, had really produced some effect upon the malady.

As I mean this communication chiefly as a brief record of facts, I have not touched upon the debateable ground of the primary seat of dysentery, whether the liver or the intestines. Of the appearances after death in such cases as were under my own care, I can say nothing, for no *post mortem* examinations were permitted in the Nisus; one of those contingencies to which, as you are aware, naval medical officers are occasionally subject. But in those I witnessed at Port Louis hospital, and a few (only three or four, I think) at Weltevreeden, the chief parts affected were the large intestines, presenting distension, ulceration in small clusters rather than in large patches, and erosion; and this agreed with the experience of others. The smaller intestines were more rarely diseased, or much less in degree. The liver might be deemed as in a state of some degree of congestion, perhaps a little softened, yet the actually diseased appearances in it were few; so that if it really gave birth to the complaint, no question could exist about its being the slighter sufferer from it. But, as the total absence on most occasions of the biliary secretion in the dejections renders it certain that the functions, if not the structure of that viscus, are seriously deranged, there can be no solid objection to believing, that, in whichever it may originate, the diseased action is communicated from the one to the other, and that it can rarely exist long in either without both participating in the evil. Were personal impressions permitted to weigh largely in this matter, I should say, that, in my own case, which, though pretty sharp, was certainly not one of the severest, I had not the shadow of a doubt of the mischief being confined, in a great measure, to the large intestines; though I am sensible that the urgency of pain there is so pressing as to divert attention for a time from the subsidiary assimilating organs, which, though likewise affected, are so in a less degree, and give rise to much less of positive suffering.

I am not aware, having seen nothing of the kind, whether an account of the state of health of the forces of the expedition, and the various results, was ever published by medical officers of the Royal or India Company's army. Those of the navy were scarcely sufficiently stationary to pursue the investigation with the accuracy due to the statistics of disease, further than the experience of their respective ships furnished. Neither had they the means of knowing from authority details of the land service; nor could they, in fact, know more than what casual statements or rumours supplied of their own. No physician to the fleet, or other superior medical officer, was present, to whom it belonged officially to call for returns from the various ships;—one of those strange anomalies in our service frequently witnessed in the great naval operations of the last war, and continued to so recent a period as within the past year; but for which arrangement it should be distinctly understood the higher authorities of the navy solely, not the medical department or medical officers, were responsible. All the necessary information on this point, indeed, was sent home, and no doubt exists in the offices of the respective departments. From these, it might be a source of interest to trace out full returns of the numbers of European and native troops taken ill, the recoveries, deaths, invalids, and discharges otherwise, as well in the reduction of the island, as during our subsequent occupation of it. To those who may be carried by the course of service into the same or similar situations, such a document might serve as a useful guide, while it added something to the general stock of intelligence regarding casualties in fleets and armies employed in distant regions,—a species of knowledge which is less abundant, I mean the published portion, than could be wished. The returns that exist on the shelves of offices, or the information they convey, are either rarely accessible to the public and to the service at large, unless under special circumstances, or they are not often made known until the interest of the occasion has passed away, or a diminished degree of attention directed to it. The particulars they furnish become thus less valuable than under a different arrangement. And as the operations of war necessarily carry us into dangerous and untried situations, in which, from their very novelty, something must be left to chance as well as to the skill and resources of those in authority, yet difficulties, obstructions, and evils are already half-overcome, by being prepared for them in the knowledge of what to avoid, and what to depend upon by reference to what has been done before.

I venture, therefore, to suggest for consideration the publication in future of a medical history of each expedition, derived from official sources, as speedily as may be, after its conclusion. This, indeed, may form a serious additional tax on the superintendents of such departments, whose daily labours are already much too various and onerous to permit more than an inspection of such documents. There is therefore the less probability of their giving us through the press, so often as could be wished, connected and practical views of the difficulties often encountered by armies and armaments, with the most advantageous means by which they should be opposed. Such duty, it may be thought, should devolve on the senior medical officer employed upon the spot in each fleet and army; and were he sufficiently unoccupied to have leisure for that purpose, he is doubtless the most fitting person; but while actually engaged on service, he has usually more pressing work to perform. The calls upon his attention are too numerous; the distractions of the moment too various, to surrender to thought that time which must be given to action; and from this cause it is that we have fewer such accounts from the medical officers of the army and navy than we otherwise should. These must, therefore, be commonly drawn up at home, and perhaps by more stationary official persons; the *disjecta membra* of numberless returns, reports, and details, methodized and digested in the quiet of an office where all the information bearing upon the subject is at hand. In fact, to obtain these returns in a complete state abroad is not always perhaps practicable; and of the difficulty of so doing, even upon the spot, when not clothed with official authority for the purpose, my own experiments may furnish an example. I had kept an extended journal of four years' cruize in the Indian Ocean, embracing all such occurrences and subjects of popular interest as came under observation, and though, among other things, the state of disease at Java formed one of the items, I could gain no precise information of the numbers of sick in more than two or three ships of the fleet. This arose from no disinclination on the part of the medical officers to afford it; but chiefly from the little intercourse of a private nature permitted by the active nature of our service; the difficulty of communicating in a large fleet on what was in my position merely a personal matter; and the delicacy of soliciting from gentlemen to whom I was a stranger what I felt they had no right to give, and the motive for asking which might be misconstrued. To the Commander-in-Chief, indeed, such returns were duly made, and others sent home to the medical authorities according to the custom of the service; but these were necessarily not available to other inquirers.

It might seem an omission were I not to advert in a few words to the discrepancies in the treatment of dysentery obvious in the works of medical writers. We can scarcely reconcile them otherwise than by supposing, that certain local, though unexplainable causes, produce diseased action in the animal economy, with some shades of difference in different places, and perhaps in the same place at different times. If this variation really exists, of which there seems to be no reasonable doubt, either in some little novelty of symptoms, or in the extreme aggravation of those already known, we can be at no loss to conceive why there should be greater or less power, and consequently variety, in the remedies employed according to the scene of its action or the degree of its violence. The usual dysentery of Europe, excepting such an epidemic as prevailed in Ireland in 1818, is not so fatal or protracted in duration as that of the Tropics. The dysentery of South America carries little more than half the mortality of that of the East Indies; and that again has various shades of severity in the extensive and diversified regions comprised under that name; while in the moderate though still warm temperatures of Madeira, the Cape of Good Hope, and similar spots, it is commonly rarer and milder than where the temperature is much higher. The history of fever is as full of dissimilitudes. That of Egypt differs from the usual fevers of the Mediterranean; those from the yellow fever of the West Indies; the latter from that of Sierra Leone; and this again from the pestilential disease of the River Niger; while nearly all of them vary many shades from the fevers of Europe. Were I disposed to generalize, it might be said that in Africa and America the sanguineous system is chiefly affected; in Asia the chylopoietic viscera; in the former the most fatal maladies are fevers; in the latter, cholera, dysentery, and liver complaints; and while the merely febrile class admits of some greater degree of uniformity of treatment; the other, to which I particularly advert here, offers that extreme diversity to which allusion has been made, and the chief causes of which are perhaps to be sought in the probable variations of the complaint itself, according to the locality in which it prevails, as well as the number of organs affected. Thus we find it a more complicated disease, requiring so much more delicacy and tact to treat, and hence, no doubt, the frequent failure in the best hands of every mode of practice hitherto devised. Remembering these circumstances, we may safely acquit practitioners of mere caprice in the number or nature of the remedies tried or suggested, and confess that our differences of opinion spring from the imperfection of our art; while this again is but the result of the laws of nature herself, which being constantly in process of change, they change likewise in part the diseased affections we have to remedy, as well as the animal frame where they are seated, though the causes or the precise extent of such changes are often hidden from our limited powers of perception. Numberless facts in the history of medicine teach us the existence of such variations nearer home. We need travel no farther for an illustration than the treatment of a complaint which falls frequently under the observation of every practitioner. In the latter half of the last century, some of the most distinguished physicians treated acute rheumatism from the first by the use of bark, with a degree of success so remarkable as wholly to relinquish bleeding. If this be true, and we cannot reasonably suspect mistake or deception from Sir Edward Hulse, Drs Hugh Smith, Fothergill, Fordyce, Swediaur, Haygarth, and others, what can we conclude from the different, and, as we suppose, improved practice of the present day, but that the disease, or human constitution, has undergone a material, though imperceptible change?

The question to which I have now adverted, of certain localities in tropical regions of apparently similar character and climate giving origin to a different class of malady,—as in one place chiefly to fever, and in another to dysentery or other disease,—offers an ample field to the inquirer into medical topography. Here it is necessary only to advert to it as a subject for curious speculation. Few can have been in such countries without having their attention drawn to the fact; but whence those differences proceed, or how brought to act in their peculiar way upon the animal frame, or why one prevalent disorder in a particular spot subsides, as we occasionally find, to make way for another, defies the keenest observer. We all know, indeed, that the general health of a community improves with the advance of civilization. We know, likewise, that, from the same cause, the acute and fatal malady of the ruder condition of life subsides into the more chronic or modified affection belonging to a period in which the comforts, arts, and appliances of a more polished state are better understood and practised by the inhabitants. It is obvious that a country well cleared of wood and jungle, well drained, well cultivated, and a people enjoying the conveniences, and fully appreciating the advantages of the municipal system and strict police regulations of polished communities, will experience less of all disease than where contrary habits and circumstances prevail. It will likewise be of a less fatal description. Thus fevers, as they are commonly the first and most serious scourge of new settlements, are also the first to subside into something of a mitigated character, or possibly assume a new though less destructive form. So dysentery has in other spots settled down in time into chronic diarrhœa, or affections of the liver.

As an example of these changes I may instance the city already mentioned, the capital of Java. The state of health at the period of our visit was much superior to what it had been even fifteen or twenty years before. Fevers, I was assured by some residents, and concurrent testimony fully confirmed the statement, had subsided one-half within the previous forty years, while dysentery, though modified in character, had not diminished in the same proportion; though it was likewise true that, in the same period of time, the population had dwindled from about 165,000 down to about 55,000 persons. These accounts, though necessarily vague, yet furnish a sufficient approximation to truth to prove that changes are going on; and that time, perseverance, and intelligence, applied to the circumstances in which we are placed, will render the most unpromising spots habitable, if not altogether healthful. Were a conjecture to be hazarded on the cause of the slighter diminution of dysentery, we might assume that the atmospheric poison which had produced fever, becoming subdued in virulence by the improved condition of the surrounding country, and no longer capable of influencing the sanguineous system, has yet power seriously to derange the functions of the *primæ viæ* and digestive organs; while the habits, or perhaps injudicious diet of the people, applied as it necessarily is to the immediate seat of the disorder, may tend to keep up the irritation, when, from whatever cause, it has once appeared. As one of the minor matters for remark, on the character of their cookery for example, it struck me in Java generally, that there was used much less of Cayenne pepper and the warmer spices than in English India; while many of the dishes were spoiled to our taste by swimming in oil or melted fat. So much obscurity, however, attaches to the whole inquiry as to the causes that make certain spots apparently similar, the one to be healthy, the other the reverse, or to produce diseases of different character, that the boldest theorist may be indulged in his conjectures whatever they be. It is, indeed, a fine and nearly untrodden field for an essay; and the medical philosopher who handles it successfully is certain of insuring fame. It is true that much time, labour, and observation, must go to the solution of the question. Nor may we ever certainly determine, whether it be simply heat acting upon moisture of peculiar character; exhalations or miasmata from decomposed vegetable and animal matters; impure water; peculiar atmospherical currents; certain habits of the people; addiction to particular qualities of food, fruit, or other ingesta; or to what many persons are disposed to attribute it, a peculiar and subtle vapour of volcanic origin escaping in certain districts, from the surface of the ground. All these causes have been supposed to influence the unhealthiness of this great capital of the eastern possessions of the Dutch; and, as I ventured, when on the spot, to make some general observations on what I saw in a work not medical, and therefore not likely to be known or remembered by those whom the question professionally interests, I make no apology for transcribing their substance here.

"The canals to which allusion has been made, I am told, are less numerous than they formerly were; and it is perhaps to be regretted that General Daendels, the former governor, who seems to have possessed the inclination as well as the power, did not wholly obliterate the nuisance instead of merely doing it in part. They are about forty feet broad and two or three in depth; some with a languid stream; others with little or none, particularly in the Chinese suburb, where one or two were covered with green scum, to which a powerful sun speedily gives life and action, and a few of them exhaling offensive odours. Certain bad qualities are attributed by visitors to the trees lining some of the streets, such as preventing a free circulation of air, and forming receptacles for the concentration of noxious vapours arising from the canals. These objections carry little or no weight, for these agreeable ornaments are too few in number to produce any serious effect; and, admitting they attract such exhalations and retain them till finally dispersed by the wind, the argument would be rather in their favour than otherwise. I can vouch that there is no want of a free current of air in the streets, for while rambling to and fro during the fiery sea breeze, I found it necessary to secure my hat firmly on my head lest I should lose it.

"After all, it will be matter of much difficulty to fix the exact causes of the unhealthiness of Batavia. Its low situation, the adjoining swamps, the moisture of the rice and paddy fields acted upon by the sun, the nature of the system of gardening with tubs of filth, the vicinity of particular manufactories supposed to be deleterious, the luxuriancy of vegetation, and the canals,—all seem insufficient to account for the fact;—for a hundred other spots in the island labour under similar disadvantages with comparative impunity. Every one here is aware that several parts of the coast of Java are inimical to health, while, as they recede from it towards the interior, this tendency decreases, and even twenty miles distant from the capital the situation is deemed salubrious. Yet the chief apparent causes operating in the one place seem as active in the other. Whence, then, this difference? Probably some other agent; for the vicinity of the sea is more cool; it enjoys the full benefit of a pure breeze, and in the majority of countries is sought as a restorative of health. On the other hand, this coast is usually flat, extensive tracts are uncovered at low water, and much of the shore has been gradually gained from the ocean. Near Batavia this is strikingly the case; and a peculiar vapour of greater density than ordinary is observed to arise and hover over the newly uncovered land, which requires a brisk wind to disperse. Either this must have a different origin from what it commonly has, or we must suppose, which is not probable, that mere evaporation from salt water marshes is so much more poisonous than that from fresh; because the latter at a distance from the coast is comparatively harmless.

"The conjecture of a volcanic vapour is strengthened by accounts of the shock of an earthquake which occurred here near seventy years ago, raised the bed of the river, formed a bar at its mouth, and by which some extent of land was gained from the sea. Shortly after this event the mortality for a time in the city is stated to have fearfully increased. It is remarkable that Banda and some other islands to the eastward, I was assured, offer similar phenomena of the seemingly deleterious effects upon human life of a vapour supposed to be volcanic, though possibly quite as likely to arise from other causes, issuing from the earth; while it appears certain, that several portions of the coast of South America permanently, uncovered by a receding ocean, are also known as particularly unhealthy. Bantam in this island is another example of the same peculiarity. Stagnant and impure canals are therefore probably but subsidiary to other more potent causes of mortality; and we may presume the inhabitants think so, or otherwise it is inconceivable they should not long ago have been filled up. Such a suggestion was thrown out, and partly, as already hinted, acted upon. And as a measure of precaution we may be induced to complete what has already been begun, sparing, perhaps, one or two of the principal; for no scruples of delicacy should be permitted to operate in abating, not merely a nuisance, but a probable assistant to pestilence.

"Whatever be the primary origin of unhealthiness here, an Englishman will believe that the diet and habits of the residents assist the poison of the atmosphere. They eat abundantly of animal food commonly immersed in fat melted to oil; they delight in hot and hearty suppers, that being the favourite repast of all classes of the whites; they sleep constantly after meals, as is usual with all foreign colonists in inter-tropical countries, and therefore probably not a source of injury in itself; and frequently drink freely of fermented and distilled liquors to accompany the pipe,—the companion of almost all their hours, whether devoted to pleasure or business. Oleaginous matters have been considered by some useful in dysentery; but the results would imply that such is not the case in Batavia. The infatuation for ardent spirits, of soldiers, and sailors, chiefly natives of Northern Europe, who came hither in the service of the Dutch East India Company, occasioned the loss of thousands of that valuable but commonly thoughtless class of men; for where they were enabled to get intoxicated for a penny, which is the case in this city, it is in vain to hope they will forbear. Eastern sailors, being much more abstinent, are likewise much more free from disease. From the same cause, no doubt, as well as from the less exposed nature of their duties, women of all classes and colour suffer infinitely less in proportion than men. I had no means of gaining access to the register of deaths, but I was told by an intelligent inhabitant that there were distinct gradations in the scale of mortality. Europeans are, as may be supposed, the greatest sufferers; next creoles and half-casts; and then Chinese; the natives proper, or Javanese, the Malay race, Baliers, Buggese, Amboynese, and other natives of the eastern archipelago, of whom there are great numbers here, do not suffer materially. The degree of heat is seldom distressing, considering the latitude 6–10 S. longitude, 106–51 latitude; the city being cooled by the sea breeze. Fahrenheit's thermometer in the shade usually ranges on shore between 80° and 88°; at anchor in the bay the former is the general temperature beneath the upper, and consequently more exposed, deck of a ship. In the rainy season, I am told, the streets are frequently ankle deep in water, and towards the end of this period the mortality is more considerable than at other times. On the whole, however, it is gratifying to hear that this is much less than it was thirty years ago, or even half that space; and it may be hoped that, under an enlightened English government, always attentive to the subject of health, and a police more than ordinarily strict, it will admit of still further decrease."*

Although more than thirty years have elapsed since the foregoing passage was written, and above twenty since it was published, the subject of atmospheric phenomena, as the primary cause of disease in the locality there mentioned, or in others, remains nearly as it was. Analysis in the most competent hands has failed to detect those minute variations in the air we breathe, which, nevertheless, unquestionably exist, as we feel by their obvious influences on the human frame; nor shall we probably be better informed until the science of pneumatics make many strides in advance of its present state, by the possession of finer instruments, or more delicate tests for that purpose, than she at present possesses; or until some fortunate discovery more fully unveils to the diligent inquirer that still obscure department of natural knowledge. Then, and perhaps not till then, we may probably be more successful in diminishing the access of disease, by knowing more precisely from what it proceeds.

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* Voyage in the Indian Ocean in 1810–11, 8vo, pp. 84–85, 1820.

That more has not been attributed to the quality of the ingesta received into the stomach in producing or keeping up dysentery, than really belongs to it in general opinion, I have had another corroboration since the preceding pages were written; indeed, within these few hours, in the verbal account of an intelligent officer just returned from active service in the China expedition.

He says there seems to be but one opinion, that the chief cause of the disease arose from the inferior quality of provisions supplied to the troops. Much of the animal food had been imperfectly cured in India, and portions of it had become, in his own language, "rotten;" even a slighter degree of decomposition than this implies, I am satisfied, from what I witnessed in 1811, would have had its effect. His statements otherwise were appalling. Out of about 890 men in one regiment, less than thirty were at one period returned fit for duty,—and of those about 500, or nearly so, eventually died. Compared with this, the plague is a mild disease;—and, in fact, we are informed by some records of the French army in Egypt in 1799–1800, that more deaths occurred from dysentery than from plague.

I cannot conclude without repeating my satisfaction at the Minden, being appropriated to her present duty, and fitted, as I understand, with all that can be supposed calculated for the preservation of human life, and the prevention of human suffering. No class of vessel can be more useful where warlike operations are going on, and no English armament should ever be dispatched without so unostentatious yet useful an attendant. She forms a travelling and safe hospital, rarely in danger of interruption from an enemy. She is placed in no jeopardy by adverse circumstances, such as the miseries of retreat before a superior enemy's force. She may be made a depot for medical officers and medical stores, ready for transference to any quarter. She comprises within herself more comforts and accommodation than military hospitals on short and occasional expeditions commonly possess. She follows with facility a coast line of operations, chooses without disturbance to patients the most favourable position for health, receives casualties as they occur, and thus renders the fleet more efficient, by clearing it of the incumbrance of the disabled and diseased. Whenever there is sufficient accommodation she can perform the same kind offices for the troops. In the late Syrian campaign, such a vessel would have been invaluable. All private accounts are loud in lamenting the want of such an appendage, which they agree would have saved many lives and much distress; for in several ships men were dying from disease within a few yards of the guns roaring in action; while the want of accommodation in others for the numerous dysenteric cases thrown suddenly on board them for conveyance to Malta hospital, added to the peculiar calls attendant upon their complaint, for which any but a ship appropriated for the purpose is so ill adapted, gave rise to scenes which it would be painful to detail. The authors of so dire an economy could have no idea of the miseries they entailed upon its victims.

I rejoice likewise that an inspector of hospitals goes in her. Good service must be rendered by both, if the views and wishes of that officer be met with that ready concurrence, and in that conciliatory spirit which such a service demands, and which is, in fact, essential to his and her complete success. It is to be hoped that this is but the commencement of a system (I mean more particularly the appointment of an inspector, for all the stations do not require at all periods an hospital ship, though all expeditions certainly do), to be acted upon invariably in future wherever there is a Commander-in-Chief. Let the medical staff of a fleet or station be no more shorn of a legitimate head or chief, than any other department, or given in charge to irresponsible persons, or what cannot be generally understood as an unaccountable principle of naval economy, left absolutely in no charge at all. Let us hope we shall never again witness the extraordinary spectacle lately exhibited of a large Mediterranean fleet containing twelve or thirteen thousand men, with numerous sick and many wounded, without a single superintending medical officer, who, by superior rank, could control or direct a junior, if he chanced to find him entertaining unsound theories of disease, or following injudicious practice. It is difficult to understand how a system so imperfect and unknown to any other branch of service in Europe should have been permitted to exist so long in the British navy; and this, too, against the expressed wishes and remonstrances of those who best understood the matter,—the medical officers. An omission so strange may imply marked confidence in the general character and talents of those gentlemen; and such confidence, I am proud to say in my experience of the service, has been fully deserved. But while it indirectly complimented their efficiency, it proved seriously injurious to the interests of the body. It interfered with that claim to promotion which the senior surgeons of the service, of fair professional and literary acquirements, had a right to expect; and while it exacted from them the highest degree of skill and responsibility, withheld the reward. Let me further add, it injured science, by preventing an observant medical officer, vested with the requisite authority, from gaining those enlarged views of disease which, thorough acquaintance with the interior of a fleet, must ever afford to one in that position, so much better than to him who has merely charge of a single ship. It likewise precluded the surgeon of superior talents from the opportunity of making his acquirements known to an official chief on the spot; and, on the other hand, by the want of this constant and prudent supervision, gave tacit encouragement to indolence or negligence, if any were so disposed. Superintendence, seniority, gradations of rank, and of course of responsibility, are as necessary in the medical as in other departments, however high the personal character of the gentlemen who composed it. Without such authority and distinctions, no military body can have its full measure of usefulness or weight in general opinion. The authorities at the Horse Guards saw this long ago, and acted upon it accordingly. Those of the navy could not be so convinced; nor had the medical officers influence enough to overcome a resistance opposed, as well to their wishes and interests as to the solid advantage of the service at large, although very little observation sufficed to show how well the contrary system had worked in the army. In it the arrangements were much more complete. No unhappy parsimony was permitted to interfere with its usefulness; no disposition evinced to deprive the medical officers of the rank or respectability accorded them in civil life, or in all civilized communities; no remnants of barbarism shown, in what many of its members supposed, their studied neglect or depression; no attempt made to class men of education with illiterate and inferior persons in military rank; nor were they sent forth into service without professional seniors in authority to whom appeal for advice and assistance could be made when emergencies occurred. In a word, the land service, unlike what the medical officers of the navy believed theirs to be, was not starved or depressed by imperfect or mistaken views of those who governed it. It is not necessary to do more than to hint how ample, and how properly so, would have been the medical staff of an army comprising the same numbers of men as the late Mediterranean fleet. Whereas in it, as we have seen, there was not one controlling professional authority.

I need not point out to you the necessity for such superintendence. But to others in authority, it may be a point of duty to say, that it is not to be measured, as has been hitherto too frequently done, by the sum it may cost, though, in fact, that sum is so small as to form one of the most trifling items in the expenses of a fleet. But we must estimate it by the good that may be accomplished or the evil prevented, as regards the health of large bodies of men congregated together under trying circumstances, and exposed by their calling and position to nearly every injury and disease to which the human frame is subject. The field for medical practice is consequently large, such as practitioners in civil life rarely witness. Extensive and obstinate disease is often found to prevail; and where, as we continually observe, the remedies useful in one spot or country are less so in another, it falls more especially within the province of the local head of the department to give his labour and skill to the consideration of such as may be exhibited with more advantage. Professional character not merely renders this becoming on his part, but the simple fact of his position as chief makes such devotion of time and talent imperative. And in no way or place, perhaps, can humanity be more evinced, or science benefited, than where, in addition to such efforts in such an extensive field, he selects from those under his orders able and diligent men for carrying into effect his views, whether of prevention or cure. In the navy, the absence of a chief on foreign stations has thrown this duty commonly upon the subordinate, that is the surgeon; and this responsibility has occasionally elicited talent and high character. But he, having no charge or authority beyond his own vessel, could carry his skill or ingenuity, however marked, no further; and as the exertion was voluntary, he might choose to do neither beyond what the strict routine of duty required. In fact, we often find that it is not always those who mingle most with disease that either describe it best, form the most correct ætiological views, or point out the most efficient remedies. To do either well requires not only a person who possesses the opportunity of seeing it, but likewise an enlarged and philosophical mind to turn the occasion to advantage; one grounded in general knowledge, who, diligent in observing, has likewise leisure and inclination to think upon what he witnesses; to investigate, to compare, and collect (if I may use the term in this sense) varying cases; to draw inferences, such as circumstances reasonably justify, without his attention being distracted or diverted by details that may safely devolve upon others. The naval and regimental surgeon must unavoidably be much occupied by details. His position requires it. But it is not necessarily so with an inspector of hospitals. Here, therefore, is the primary utility, in addition to presumed general ability and experience, of the presence of such an officer in every squadron.

The evil he may prevent besides the positive good he may do, must not be forgotten. Happily there is nothing to fear from ignorance or incapacity; for few bodies of men have been more laboriously, though unostentatiously, useful in the most trying situations, or better qualified to be so, than that to which we have the honour to belong. But there may be something to fear occasionally from self-will in peculiar opinions, something from pertinacity of temper, something from that disposition to theorize which prevails still more extensively on shore than afloat, and leads or misleads, ingenious men to indulge in speculations that more sober observation may not warrant, and thus arrive perhaps at plausible, though erroneous, conclusions. Theories are very favourite and amusing playthings to active imaginations; and when merely contemplated or evolved, not acted upon, may be safely left to the indulgent favour of their authors. But when brought into operation in the practice of physic, they may occasion, if unsound, extensive mischief ere their fallacy become obvious. A heavy responsibility, in fact, rests upon any medical writer of note who broaches new professional doctrines without having devoted much thought, time, and inquiry to the subject; for it is no light matter to remove our settled landmarks of disease, without having something indubitably good and true with which to replace what may be swept away. All this is familiar to the profession. But as it may not be so to others, who may, nevertheless, influence or control professional arrangements, an anecdote may suffice for such instead of an argument.

An assistant surgeon of our service in India, of good attainments, a fair classic and mathematician, and well read in his profession, had adopted from the perusal of some French works the atomic or adynamic theory of the dysentery then prevailing in the fleet. The conclusions he drew were, that the usual medical treatment was erroneous; that its frequent ill success proved it to be so; that in fact, tonics, stimulants, &c. formed the only correct mode of meeting the emergency. He could not be convinced of the fallacy of his views, complained that he was not permitted to treat the sick as he wished to do from scientific inductions or on fixed principles, and ventured to hint to the surgeon of his ship that he had either formed no certain opinion upon the complaint, or a very injudicious one. At length he was himself taken ill; an opportunity had now arrived when he could no longer be thwarted or opposed in his wishes; for, however authority might interfere in his treatment of others, he could at least treat himself as he pleased. Cinchona, as the most favourite and available tonic, formed his chief dependence, and this remedy he used with all the zeal of an enthusiast and the perseverance, as it proved, of a martyr, for in a few days, though the attack was not originally severe, he died. No better illustration can be given of the errors which clever men may commit, and of the propriety of every such men being controlled by age and experience. Had the surgeon of the ship been in any way removed, this gentleman would probably have had an acting order to do the duty as such, and might in that case have made some havoc among his patients, not as we have seen from want of knowledge, but rather from knowledge misapplied; and, however other medical officers might have disapproved of his system of practice, the absence of a superior in rank left them wholly without power to prevent it. This is one of the cases against which a controlling medical authority alone can guard; and is of itself the strongest argument that no station, at home or abroad, however small the numerical amount of ships employed upon it, should be left without one.

In an arrangement so imperfect as this was, it is understood you had no voice. It rested, as financial matters must commonly rest, with higher authorities, who, probably conceiving it less a point of professional importance than it really is, looked merely to the cost and not to the practical utility of the presence of a medical officer of higher rank than surgeon. I am happy to see that this mistake has passed away with those who chiefly displayed it, and that the members of our corps may in future look forward to that advancement accorded to all other branches. The naval service is in a long and large arrear of debt to the medical officers. Let us hope that what has been so long withheld, or not acted upon, will be repaid by the just and liberal spirit of the enlightened noblemen who now presides at the Admiralty. By this, and this alone, can the disgust engendered by a sense of what was deemed protracted neglect, be wholly dispelled. When this is fully carried out, and a few other objectionable points which still exist removed, medical men of high character will not only enter into the service, but what I deem of much more importance, they will remain in it, for that I need not say has been the great difficulty. Some anomalies also now observed will then disappear. For instance, we see a surgeon of thirty-five years standing and still serving under a pendant, of varied and responsible service,—of fair professional merits,—of irreproachable character,—possessing high testimonials,—whose literary productions drew warm commendation and patronage from men of the greatest talents, and holding the very first positions in this country*—and who was, moreover, the senior surgeon afloat on the birth of the heir to the throne, which gave promotion to other senior officers in active service;—this gentleman remains still unpromoted; an omission, which, as no other individual unites similar claims, can only have occurred, it is presumed, from being overlooked amid a number of applicants.

But I reserve a full inquiry into the working system of our service for another opportunity, and more space than may be allowable on the present occasion.—I have the honour to be, my dear Sir William, your very faithful and obedient servant,

Woolwich, JAMES PRIOR.
14*th March* 1842.

Allusion having been made to the completeness of the hospital ship for the fulfilment of the duties to which she is destined on the coast of China, it may not be uninteresting to the medical reader to detail a few of the particulars of her establishment; and satisfactory to the public to know, that nothing has been neglected which, to a considerate humanity, seems necessary for the recovery and comfort of the brave men who are fighting the battles of their country in a distant and unhealthy region.

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* Among many others who might be mentioned were the late Earl of Liverpool when at the head of the government, Mr Canning when Foreign Secretary, and the present (as well as the late) Sir Robert Peel.

The Minden is a 74, deprived of one tier of guns, for the purpose of making more room for the accommodation of the sick; built in India; roomy; well adapted for her new employment; and commissioned as a fifth rate, with 280 men. She is fitted for the reception of 200 patients, and ventilated upon the plan of Dr D. B. Reid, who went to Plymouth, where she was fitted out, to make the necessary arrangements.

The hospital establishment consists of one inspector of hospitals, one surgeon, five assistant surgeons, one surgeon's clerk, (that officer having charge of large supplies of medicines and stores, and being accountable for their care and distribution); one wardmaster, (in lieu of matron); sixteen landsmen as nurses, (four of the number something better paid than the others); three washers, (men's wives,) besides servants to the medical officers, and necessary mess attendants. All matters relative to the hospital are necessarily under the control of the inspector.

The supplies of medicines, of surgical instruments, of bedding, linen, washing machines, portable water closets, and stores of various kinds for all probable wants, are liberal. The cradles are as usual of iron, well secured to the deck, and fitted with rods so as to prevent the sick being thrown out by the pitching of the vessel in stormy weather; a provision likewise extended to some of the utensils. There are likewise twenty cots for such as may require them. A number of light screens, placed as may be necessary, to defend patients from currents of air unavoidable on the deck of a ship, where ventilation is so necessary. A boiler for warm water and pipes for its conveyance, supply a certain number of baths. Books for the perusal of the patients have been selected by one of the chaplains of Greenwich Hospital.

Supplies for victualling the sick are in charge of the purser, who thus acts as purveyor, delivering them daily upon the requisition of the surgeon, and superintended by one of the assistants. The stores of this description sent on board are said to be about 70,000 lbs. bread and flour; 55,000 of beef; 7000 of Scotch barley; 5000 of salt; 9000 of vinegar; 1500 of tea; 8000 of sugar; 400 gallons of wine; 6500 lbs. of soup and bouilli; 2000 quarts of gravy soup; 1000 lbs. calves'-feet jelly; with such other things as are necessary under the scheme of hospital diet; and in addition to these, there are three tons of patent preserved potatoes; one for the Minden, and two for the use of the remaining vessels of the fleet.

A variety of other conveniences and comforts customary in such establishments on shore, besides strict regulations, always enforced in the navy, regarding cleanliness, clothing, bedding, victualling, the care and distribution of stores, and the duties of the various officers, render her the most complete vessel of the kind that ever quitted England.

ART. III.—*Observations on the separate and combined actions of the Muscles of the Eye and its appendages, with their uses and physiological employment in the animal economy.* By EDWARD HOCKEN, M. D., M. R. C. S. L., F. R. M. C. S., &c.*

THE contents of my present paper include a consideration of the physiology of the orbital *obliqui*, and four *recti*, the *orbicularis palpebrarum*, *levator palpebræ*, *ciliaris*, and *tensor tarsi*, both separately and in combination. The subject has been rendered uncertain by the number, diversity, and unphilosophic character of the opinions which have been from time to time promulgated on it by different teachers. I will endeavour in the following remarks to found my opinions and explanations on an unprejudiced and strict observation of nature, without reference to any speculative notions. I shall commence with the oblique muscles.

The diversity and contradiction which exists in the received opinions concerning the normal functions of the orbital oblique muscles, incontestibly proves that little sound discretion has been employed in this investigation, the results of all of which have been most unsatisfactory. Many physiologists formerly imagined that the superior oblique turned the eyeball upwards; and hence the absurd appellation of *musculus patheticus*, which was given it. The principal opinions which are at present entertained are, *first*, that the superior turns the globe downwards and outwards, whilst the inferior directs it upwards and inwards—an opinion most nearly allied to truth, as I shall show, and one held by the greatest number and best authorities of the present day. *Secondly*, Mr Duffin tells us that the superior oblique rotates it downwards and inwards, the inferior in the contrary direction, viz. upwards and inwards. In his book on Strabismus, he says, "towards the nasal canthus and upwards." *Third*, Mr Walker asserts that the superior oblique turns the axis of the eye, that is to say, the pupil, directly inwards; the inferior in the opposite direction, and likewise turns it inwards. *Fourthly*, some learned authorities imagine that the superior turns the eye upwards and inwards, and some, acting on such principles, divide or attempt to divide it in convergent strabismus, when the eyeball is directed upwards and inwards.

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* Read at the Royal Med. and Chir. Society, May 24, 1842.

I shall endeavour to overturn the whole of these fanciful statements, giving, at the same time, what I believe to be their true physiology, founded on the laws of muscular action and direct experiment.

1st, That muscles can only act in the direction of their fibres, or in the direction of their tendons, as modified by a pulley.

2d, That when acting over a sphere, or a segment of a sphere, to which they are attached, the spherical body itself will receive a rotatory motion in compliance with the foregoing law; the fixed attachments being approximated, and the sphere rotated to the extent and in the direction allowed by such connections.

3d, That a corresponding and antagonizing power, acting in the opposite direction, would rotate such a body back again through the same arch, and carry it (supposing its sphere of action similar) to a corresponding distance in the opposite course.

4th, That both forces acting simultaneously would antagonize each other, giving rise to a new force, the medium of the two, and thus causing traction in the intermediate direction of the two previously existing powers.

5th, That powers curved in correspondence to the portion of a sphere over which they act, and to which they are attached, crossing its normal axis obliquely, must rotate such a sphere on an appropriate oblique axis, and hence obliquely alter the position of the parts corresponding to its front.

On these foundations I place the following deductions and experiments. And thus it will be necessary, first, to ascertain correctly the exact direction of the muscles and tendons of which we treat. The tendon of the superior oblique runs obliquely backwards and outwards in the orbit, from its cartilaginous pulley in the frontal bone to the junction of the posterior and middle thirds of the sclerotica, below the superior rectus muscle, and curved in correspondence to the convexity of the eyeball. The inferior arises from the superior maxillary bone at a point directly opposite the pulley of the superior oblique, and also passes obliquely dorsal and lateral to the junction of the posterior and middle thirds of the sclerotica, adapted in its curve to the under and lateral surfaces of the globe, and separated at its insertion, from the insertion of the superior, by rather more than half-an inch; it is in this interval that the ciliary nerves perforate the *tunica sclerotica* around the optic nerve. Hence we shall see that the posterior, superior, and outer surface of the sclerotica will be approximated to the orbital edge of the frontal bone, close to the inner canthus of the eye, by contraction of the superior oblique; and that the posterior, inferior, and outer part of the same tunic will be drawn towards the orbital edge of the superior maxilla, opposite to the pulley of the superior oblique, by contraction of the inferior oblique muscle; the curved condition of the tendons imparting a corresponding rotatory motion to the sphere over which they act.

The motions thus imparted to the eyeball and pupil are the following, when no counteracting force is in existence. The superior oblique rotates the globe obliquely downwards, inwards, and then outwards, bringing the posterior and outer part inwards and superficially, and carrying the lower and outer part upwards and more deeply in the orbit. In this course the pupil is carried from its natural position in the centre of the orbit, but slightly nearer to its nasal side, in a curved direction downwards, inwards, and finally outwards. The inferior oblique rotates the globe from the position in which it was left by the superior upwards, inwards, and then upwards and outwards; or if it commence whilst the pupil retains its normal axis, in a curved direction upwards, inwards, and then upwards and outwards, and *vice versa* in respect of the superior oblique; the pupil during this motion being directed in a similar curved manner, the final action of each being to turn the globe and pupil outwards, the superior downwards, the inferior upwards. By the action of the inferior oblique, the lower, posterior, and outer part of the sclerotica is approximated to the orbital edge of the superior maxilla, and therefore rendered superficial, whilst the exactly opposite points are buried deeper, to a similar extent, in the orbit. The superior rotates the globe on an imaginary axis, passing obliquely from the lower, posterior, and inner part of the eyeball, to the outer, superior, and anterior part of the same, whilst the inferior rotates the globe back again in the same arch.

The following experiments may serve to prove that such is in truth the real action of these muscles separately, bearing in mind the laws of muscular action with which I commenced this paper. As regards the experiments performed on living dogs, and other animals lately, little if anything is to be learned,—indeed, the differences in their anatomy, and the difficulty of performing the operations completely and fully, have, I believe, rendered the attempts to determine the normal functions of these muscles, in this manner, quite useless. We even find Mr Duffin remarking, that, "so far as may be inferred from the foregoing experiments, very little of a conclusive nature can be deduced," in answer to his own question of the uses of the superior oblique.

Expt. 1.—In a recent subject expose the tendon of the superior oblique just after it has passed through its cartilaginous pulley in the frontal bone, without disturbing the situation of the globe; or, to insure accuracy, let the muscle be dissected just before its tendon enters the pulley, and traction be employed in the natural direction. During the continuance of this force, we find that the eyeball is rotated on an oblique axis, and that the pupil and globe become directed as previously described, being finally turned downwards and outwards. The same experiment may also be performed on the inferior oblique, when we shall observe the globe to perform an oblique rotation upwards and outwards. The best mode of accomplishing these experiments is the following: Feel for the *trochlea* of the superior oblique, immediately internal to the super-orbital notch or *foramen*, and make an oblique incision over its course of about an inch in extent, and then carefully divide the cellular tissue, muscular fibres, and fibrous expansion of the tarsal cartilages running to the orbital edge. And thus we bring into view the tendon of the superior oblique running outwards and backwards, which may be readily taken up by a small convenient hook, and thus traction exerted on the globe. If it be taken up internal to the pulley, depress the eyeball and follow the muscle slightly backwards within the orbit, lying superior to the upper rectus muscle; a hook, with its point directed from below upwards, and from without inwards, will easily include its tendon. In taking up the inferior oblique, a similar incision opposite to the former one is necessary, and the same steps as previously described may be followed.

Expt. 2.—Take an apple or an orange, and cut off a thin slice from its anterior surface, holding the portion corresponding to the eye of the fruit forwards, then place a tack with a circular flat head in the centre of its front cut surface, but rather nearer its inner than outer side, and affix to the junction of the posterior and middle thirds of its circumference, at its posterior and outer part, two narrow slips of paper or ribbon, placed exactly in the oblique course held by the two oblique muscles, alternately make traction with each, whilst held loosely in the hand, and observe the direction given to the fruit, and to the circular head of the tack, which corresponds to the pupil; it will be that oblique rotation which I have already described. By thrusting a knitting-needle through the fruit, we are enabled to observe the axis on which such powers would rotate the sphere; it is obliquely from above, external, and in front to below internal and posterior.

Expt. 3.—We can even put the oblique in action, and observe the effects in our own persons. Close one eye, and steadily regard some object placed immediately in front with the other; we find that we possess the power of rotating the eyeball downwards, inwards, and then outwards, regularly so at first, but after the organ has reached the centre, the *rectus internus* interferes, and then it is carried suddenly downwards and outwards; by a counteraction it is carried backwards, performing an oblique rotation upwards and inwards, finally upwards and outwards. No such rotation can take place on the outer side of the eye in any direction; the eyeball stops abruptly when directed upwards and outwards, at the outer canthus, or downwards and outwards, as before-mentioned.

Since the inferior oblique has a combined action with the *orbicularis palpebrarum*, the oblique rotation upwards, inwards, and then outwards, may be partly seen when the lids are slowly closed, and in an individual affected with staphylomatous cornea, the subject is completely proved, for its prominence readily points out its position, where the eyelids are fully shut; and, under these circumstances, the globe will be found to be directed upwards and outwards.

During sleep we have another opportunity of ascertaining the combined action of the inferior oblique muscle, during which condition every provision is made to protect the organ from the influence of light: the closure of the orbicularis being attended by a corresponding contraction of this muscle. If, in a sleeping child, we gently raise the eyelid, we find the eyeball and pupil directed upwards, and slightly outwards, and the pupil itself contracted; as the child awakes the globe performs a few oscillatory movements, and then assumes its normal direction. This oblique direction is, and can only be given to the eyeball by the inferior oblique muscle alone.

Let us now consider the combined operation of the two obliques. It is evident that, if both muscles act simultaneously, no rotation can occur, but the globe will be drawn in the medium direction of the two opposing forces; hence it will be drawn inwards and forwards, being compressed against the *os planum* of the ethmoid, producing elongation of the axis of the globe in proportion to the violence or force exerted by the oblique. Do we not produce this very action when we endeavour to distinguish near and minute objects? I feel convinced that any one will be conscious that it is so if he make the effort in his own person. We are conscious, during this effort, that the eyeball is thrust forwards, and at the same time compressed. It has been asserted, but I am sure incorrectly, that the cellulo-fibrous tunic, which invests the muscles, and through which the tendons pass to their insertions, would thus act as a pulley surface, causing the oblique to retract the globe into the orbit, rather than draw it forwards and inwards. Any one who has observed its texture and relative situations will be convinced of the fallacious tendency of such reasoning. The combined actions of the oblique is thus obviously to antagonize the recti muscles, since the oblique elongate the axis of the eyeball, draw it inwards, and thrust it forwards, altering the figure of the globe to adapt it to view near objects; whilst, on the conrary, the combined operation of the recti is to retract the eyeball within the orbit, and to shorten its antero-posterior axis, adapting t, as an optical instrument, to view distant bodies. Such, I have no doubt, is part of the provision made to accomplish these ends, although many other changes are, at the same time, effected.

If the combined actions of the oblique and recti be true, as here explained, it will be evident that in this, as in other instances, if we weaken or destroy one force, the antagonizing power will gain he mastery, and hence the eye would project unnaturally from division of the recti, or from morbidly increased action of the obique ;* or, on the contrary, be retracted abnormally from section or paralysis of these latter muscles, or from increased action of the ecti.

It is well known that certain occupations and employments will eventually modify the usual distance of correct vision; and this s affected by an alteration in the balance of these antagonizing muscles, alteration in the shape of the globe from their habitual action, and probably some adaptation of the retinal function to meet existing circumstances; thus, the sailor acquires presbyopic or long vision, by the constant habit of eagerly searching the distance for objects which he either desires or dreads; the mechanic becomes myopic, or near-sighted, from the minute and careful vision which accuracy of adaptation, and perfection in finish require, in operating on small and delicate bodies or substances. The inferior obliqui muscle has an especial co-operation with the *orbicularis palpebrarum*, (as I shall more fully explain in considering the actions of the orbicularis,) in winking and closure of the lids under other circumstances, as during sleep, &c.; here the eyeball undergoes the oblique rotatory motion upwards, and, if the lids are fully closed, upwards and outwards. During weeping, and under other circumstances, where there is an excess of lachrymal fluid, it has a combined action with both the *orbicularis* and *tensor tarsi;* the eyeball is held in the mode described, the edges of the lids are approximated, forming the triangular channel for the conveyance of the tears to the *puncta lachrymalia*, whilst the lachrymal sac is compressed.

We may now inquire what are the uses performed by these muscles in the animal economy? Indeed, to some they have seemed superfluous, stating that the eye might receive any or all of those movements which these muscles are capable of originating, by the separate or combined actions of the recti. How far this is he case let us now inquire. The uses of the combined action of the nferior oblique with the orbicularis is self-evident; *first*, in winking, the surface of the globe is wiped, and moisture is uniformly

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[*] I am speaking of division or weakening of both oblique muscles; one would ause the globe to project obliquely; hence, the explanation of the projection of the yeball from the division of one muscle in Mr Duffin's experiments on dogs.

diffused over its surface; *secondly*, during sleep, the organ is protected from light, concurring with many other circumstances in this respect. Both muscles, as I have already mentioned, when put strongly into action, take an important share in the adaptation of the visual distance. When, however, the action of both these muscles is moderate, they, doubtless, tend to steady the eyeball during the various motions of the head and body, when the individual's attention is strongly directed to any one particular object which he desires to keep steadily in view, the action of one or the other predominating according to the existing necessity. It has been ably shown by Hueck of Dorpart, in an essay "on the Rotation of the Eye on its Axis, Dorpart, 1838," that the office of the oblique muscles is to turn the eye upon its axis, so as to render it possible for the rays of light from any object to fall on identical, or rather consensual spots of the retinæ, even when the head is inclined downwards; a condition on which single vision is known to depend. These views are well supported by the experiments of A. W. Volkman.

This power of steadying the eye, whilst the body or head is in motion, has been strongly insisted on, and clearly explained by Hunter. (Vide Animal Economy, works by Palmer, Vol. iv. p. 275.) We find there, indeed, an accurate summary of the motions which the eye is capable of performing:—*1st*, The motion from one fixed object to another; *2d*, moving with an object in motion; *3d*, keeping the eye fixed on any object, although the head or body generally be in motion. The advantages of this power exerted by the modified and combined actions of the oblique is evident; and if this were the only mode in which their functions were made to avail in the animal economy, it would amply account for their presence. Let us now proceed to inquire what are the sources of action, causing the motion from one fixed object to another, and that which moves the eyeball in accordance with an object in motion? The recti muscles are arranged regularly around the globe, being placed in the mesial line from above downwards, and from side to side, their tendons being inserted at unequal distances from the cornea, and the shapes of their lines of connection to the sclerotica being different. The superior and inferior are about the same distance from the cornea, the external considerably further than the internal; the extremities of all are more or less curved with their convexities to the cornea. In the superior and inferior recti insertions the outer edges are further removed from the cornea than the inner, rendering these oblique, the inner and outer recti insertions are curved, but little, if at all, oblique. All the edges of these four tendons are connected by the *tunica albuginea*, which, in fact, is but condensed cellular tissue. This connecting medium passes in the form of arches from one tendon to the other, their concavity being directed backwards, and thus forms a continuous, whitish, glistening membrane, which, when seen through the translucent conjunctiva, constitutes the white of the eye. Each muscle, in passing from its origin at the apex of the orbit to its insertion, passes over the globe, and is curved in correspondence to its convexity. And thus, bearing in mind their origins, course, and insertions, there can be no difficulty in ascertaining their individual actions. The superior rotates the globe directly upwards; the inferior directly downwards; the external directly outwards; and the internal directly inwards.

I have already mentioned the combined operation of the recti in retracting the eyeball within the orbit, and in diminishing its antero-posterior axis adapting the eye for far sight; and in this particular exactly antagonizing the oblique. The globe is capable of moving in a complete circle by the action of the recti alone, without the assistance of any other muscle; each individual rectus moving it towards its own attachments, and every intermediate position being given it by the combined action of two contiguous recti.

The recti possess combined actions with some of the muscles of the brow and lids; thus, when an individual expects a blow, and the eye is prepared for violence, the eyeball is drawn fairly within the orbit by the conjoint action of the recti, the brow is drawn down and contracted; the *orbicularis palpebrarum* and the *corrugator supercilii* being put into action,—and thus this delicate organ is frequently saved from injury. We see the combined actions of the recti with the *orbicularis palpebrarum*, and the *levator palpebræ* under other circumstances; when the globe is rotated directly upwards by the unaided effort of the *rectus superior*, the upper eyelid is raised at the same time, and in a proportionate degree; for it is evident that, if this combination of action did not occur, the globe would be rotated under the lid, and the object of its possessor defeated;—again, when the rectus inferior is employed alone, and the globe is rotated directly downwards, the superior eyelid is depressed to a corresponding extent by the contraction of the orbicularis, in order to protect the eye from the intrusion of foreign matters. We employ the recti constantly in ordinary vision, to direct the eyeballs in the locality of such objects as we may desire to view, or in following bodies in motion, so as to maintain their image on that part of the retina where impressions produce the most distinct vision. This they are capable of effecting, as I have previously remarked, not only in the four directions of the four recti muscles, but by their alternate and combined action of rotating in every intermediate degree, so as to accomplish a complete circle. They are employed conjointly in the endeavour to discern distant bodies, and in the strivings of near-sighted individuals to see at ordinary distances, and here the lids are partially closed, whilst the globe undergoes those changes, the mechanism of which I have before dwelt upon. The retraction of the globe in conjunction with the contraction of the brow, and closure of the lids, plays an important part in the protection of the organ from injury, and is employed with this view, in all cases of real or threatened violence, in the animal economy.

We come now to the consideration of the functions of the *orbicularis palpebrarum ;* and, on entering on this subject, we find that different observers, at different periods, in the extensive field of physiology, have taken different views regarding the action of this muscle ; one party asserts it strictly voluntary action ; and again, another as loudly claim for it the title of a sphincter. The author will endeavour to show that its single and combined actions are peculiar, and that it may or may not be linked by unity of effort with other muscles or sets of muscles, according to the condition of the lids, and the state of the feelings and emotions.

Every muscle in the body possesses its proper antagonist, or antagonists, as I shall hereafter endeavour to prove, which controls and modifies, and limits its sphere and manner of action, or bears some definite relation in the antagonism of function ; in the instance before us the *levator palpebræ* holds this relation to the orbicularis. These two muscles possess a peculiar and alternate action ; the relaxation of one corresponding to the contraction of the other without variation during health, and this action in each seems to be voluntary or nearly so, as we are always conscious of the act. I will now mention the exceptions.

There is a medium at which the lids are uninfluenced by either muscle, in which they hold a relation to each other, occasioned by the mere influence of gravity ; in this state the upper lid falls over the globe in its upper two-thirds, covering the front of the cornea and hiding the iris, so that nothing but the conjunctiva and subjacent *tunica albuginea*, the white of the eye, are visible, constituting the lower third. The opportunities of seeing this absence of contraction in either muscle are comparatively few ; some people during sleep thus expose their eyes, but this is rare. When, however, the parts supplied by the *portio dura* are paralyzed this always occurs during sleep, or on attempting to close the organ. When the influence of the brain is removed by accident, disease, or death, we learn the fact I am now endeavouring to prove. Those who have carefully observed the dead body cannot fail to have remarked the relation which the upper and the lower lids hold to one another in and after death, whilst the eyeball is slightly rotated upwards and outwards ; and again we see the same condition in some severe cases of concussion or compression of the brain, or where, from cold or other causes, the *orbicularis palpe-*

brarum is paralyzed, and the patient is rendered incapable of closing the eye.

As it is clear that the eyelids only assume this partly closed condition by mere unaided gravity, it will be obvious that something more is required to close these organs completely, and we find in truth that such is the case. But here the questions arise, How is this ulterior action effected? and by what powers are the lids retained in apposition during sleep, and under other circumstances? The closure of the lid is a voluntary act, preceded by relaxation of the *levator palpebræ*, and attended by a corresponding contraction of the inferior oblique muscle of the orbit; hence as we close the eyelid so in proportion is the eyeball rotated obliquely upwards and inwards, and finally upwards and outwards. If the fingers be gently pressed on the globe whilst the lid is being closed, and after it is closed firmly, we may feel these movements, and convince ourselves of their reality. But a still more convincing proof may be found when the globe is affected with staphyloma, under which condition the motion of the eyeball can be followed by the eye of the observer, and the touch clearly detects the oblique position of the cornea, directed obliquely upwards and outwards, when the lids are fully closed. Whilst the lids remain closed the eyeball continues to hold the same relation, as the observation of a good case of staphyloma clearly shows; and the sleeping eye, when the lids are quickly separated, shows the same fact; taking the eye of a sleeping infant as an illustration, if we gently but quickly separate the eyelids we invariably find the eyeball thus obliquely rotated. The advantage of this combined action in winking (suddenly contracting the *orbicularis palpebrarum*, and then suddenly relaxing it,) is quite obvious, viz. to wipe the front of the eye, and uniformly diffuse the moisture destined to supply that organ; but the advantage of retaining the globe in its oblique and protected situation during closure of the lids is quite as useful, although not, at first sight, so apparent it is to insure the complete exclusion of light during sleep, &c., and thus greatly to aid the operation of that imperfectly translucent curtain, the lid.

The closure of the eyelids is voluntary, since we are always conscious of the act; and if we attend to our sensations, during its closure, we shall become conscious of a preparatory relaxation of the levator and a gradual contraction of the orbicularis, whilst the eyeball itself undergoes those movements which contraction of the inferior oblique originates. The power by which the eyelids are maintained in contact, after a voluntary effort has closed them, is exactly the same in nature as that by which the eyeball is maintained in its raised and everted position, after it has been rotated upwards and outwards by the inferior oblique. Comparatively little if any force seems to be exerted in maintaining this position of the globe and lids, little, in fact, beyond mere tonicity; since where the lids are not maintained in contact by a voluntary effort, or by involuntary spasm, as during quiet sleep, little or no force is required to raise and separate them; the eyeball still maintaining its direction. When the *levator palpebræ* is contracted voluntarily the orbicularis undergoes relaxation, and the lid is raised, whilst the oblique is also relaxed, and the eyeball assumes its straight position.

The orbicularis and levator show their antagonism of action, as muscles of expression. The raised lids, the protruded eye, the partially closed lids and contracted brow, are each of them intimately connected in action with other muscles and sets of muscles which manifest similar passions, feelings, or emotions. But it is not my intention to enter on these points at present.

I have stated that, during quiet sleep, little comparative force is exerted in maintaining the lids in a state of apposition, for we find that, to a certain extent, they can be separated without any apparent opposition, until the impression on the trigeminus induces a reflex action through the *portio dura* of the seventh, and the subsequent involuntary contraction of the orbicularis. It is evident that this is a condition for maintaining the organ in a state of tranquillity, and protecting it from the influence of light, cooperating with the position of the globe in this particular.

When the whole muscle is put into action to close the lid it is a voluntary effort, and not the mere involuntary contraction of a sphincter; whilst, however, the levator remains relaxed, and the eyelids closed, its continuous effort, if any such exists, is evidently a sphincter-like condition, although it differs not from the continuous and involuntary contraction of the inferior oblique, which, although thus continuous and involuntary, no one would call that of a sphincter. But there are a few fibres of this muscle, spread over the front of the tarsal cartilages, to which the title of "ciliaris" is applied, and which are capable of an independent action. We see them used, or in fact only one, to give a slight but meaning movement to the tarsus—a wink of doubt or slyness—or on the approach of any foreign body near the eye, which may or may not extend so as to affect the other portions of this muscle.

Painful impressions on the retina, as the influence of powerful light, occasions a spasmodic closure of the orbicularis, especially when the retina is morbidly irritable, as in strumous ophthalmia, retinitis, or hysterical amaurosis. Impressions on the conjunctiva produce similar effects—the introduction of small bodies under the lids is followed, as is but too well known, by most painful photophobia and blepharospasmus, and the propagation of irritation to the Schneiderian membrane, producing sneezing in strumous ophthalmia, shows that the conjunctiva takes no unimportant part in occasioning the excessive intolerance of light and spasmodic closure of the lids.

When, from any cause, the retina is insensible, we learn how much is dependent on the reflex action alone; for, under these circumstances, the finger may approach the organ to within the smallest possible distance, without actual contact, and still occasion no movement in the lids at all; but if now the lids be touched or the cilia disturbed, then the lids are immediately closed, distinctly showing the excito-motory function of this muscle. When, however, the retina retains its sensibility, the approach of the finger, as I have before remarked, occasions a sudden contraction and relaxation of the *orbicularis palpebrarum*, which is a valuable test in feigned blindness, and should by no means be overlooked among the diagnostic points. This muscle is extremely subject to involuntary spasmodic action, and in individuals whose healths are deranged, or who suffer from excitability of the general nervous system, nothing is more common than a troublesome and frequent winking of the eyelids of one or both eyes. But we see a still more troublesome and annoying affection, which occasionally originates from deranged digestion, or some morbid condition of the *primæ viæ*, consisting in paroxysms of constant twitching and partial contractions, which constitute what is termed "morbid nictitation," an affection which in general readily yields to an active aperient.

The *orbicularis palpebrarum* is employed conjointly with the two orbital *obliqui* and with the four *recti* muscles, among other changes, effected to adapt the organs of vision for near and distant sight, and for the scrutiny of large and also of very minute objects. When the globes are adapted for very near sight, being elongated by the conjoint action of the obliqui, besides other changes the eyelids are partially closed, and this also is one of the actions employed when near-sighted persons endeavour to discern objects—to them comparatively distant; with the recti conjointly it is employed when the globe is retracted and flattened by their operations, and otherwise fitted for use on distant bodies—here, when the sight is strained to discern something ill-defined, the brows are contracted, and the lids partially closed. These actions are combined, moreover, with another muscle, the *corrugator supercilii*, by which the brows are contracted, being drawn downwards and inwards towards the middle line. In addition to the combined contractions of the orbicularis with the inferior oblique for the purposes of diffusing moisture, and wiping the eye, and for thoroughly protecting the organ from light, they are employed when superabundant moisture exists, as in weeping, to bring the edges of the lids together, to form that triangular canal by which the tears are conveyed to the *puncta lachrymalia*, being propelled forwards by the shuttle-like action of the lower lid, and thence through the lachrymal sac to the nose; and in this operation the orbicularis co-operates with the *tensor tarsi*, which stretches over and compresses the sac. A little consideration will readily convince us that the orbicularis and the *levator palpebræ* possess each of them a combined action, the first with the *rectus inferior*, and the second with the *rectus superior*. Thus, if we depress our eyes by the action of the *inferior recti*, or if we observe the process in others, we can, in the first place, feel, and, in the second, perceive, that, in proportion as the eyeball is rotated downwards, so is the lid proportionally lowered by the contraction of a portion of the orbicularis, and that in like manner, as the eyeball is rotated upwards by the contraction of the *rectus superior*, so is the lid elevated by the *levator palpebræ*.

Sphincters maintain a state of permanent and involuntary contraction,[*] under all ordinary circumstances; but when the functions of other parts of the economy require the relaxation of those apertures which any given sphincters are destined to close, the efforts of expulsion originated, under these circumstances, are always attended by relaxation of the appropriate sphincter, which also occurs without any knowledge on the part of the individual, or any voluntary action whatever on the part of the muscle; and again, as soon as the effort of expulsion ceases, then the sphincter resumes its contraction quite without any volition on the part of the person concerned. The efforts for closing the aperture are always appreciable, and afford considerable resistance to their dilatation under all other circumstances than those mentioned, with the exception of the voluntary power both of contraction and relaxation which we possess over them. Hunter remarks that they should be called muscles with power of occasional relaxation. In these particulars the *orbicularis* presents many striking differences to ordinary sphincters—relaxation being the ordinary, and contraction the occasional condition of this muscle; besides its closure is not involuntary, and when closed, little if any active power of contraction is exerted to maintain the eyelids closed, although the excito-motory function presides over this aperture, as it does over the other orifices of the body. It also always co-operates with another muscle during closure of the lids—the *inferior oblique*, in protecting the eye from the influence of the light—a muscle which seems to possess a peculiar function, but similar in this respect to the orbicularis; which last possesses a distinct antagonist, similar to the strictly voluntary muscles. Although it is fair to consider that, as the sphincters placed on the middle line of the body were originally composed of two separate halves, that each half is the proper antagonist to its fellow portion, whilst other muscles antagonize them in function—thus we find that the muscular fibres of the rectum antagonize the *sphincter ani*—the passive condition of one corresponding to the active contraction of the other, as is the case in the instance of the *orbicularis palpebrarum* and the *levator palpebræ*.

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[*] Hunter remarks that sphincter muscles remain always above three parts contracted.—Works, Vol. iii. p. 154.

Mr Hunter's observations on this subject tend to confirm my own opinion of the peculiar actions of the *orbicularis*. He remarks,[*] that, although many circular muscles may not have the mixed contraction of sphincters, as the orbicularis, yet that muscle has a disposition to contract peculiar to itself. Its relaxation is to be reckoned of the active kind, which may be called the relaxation of watchfulness ; and it is, when tired of this species of action, that it contracts, which, on the contrary, may be called the contraction of sleep; or it may be considered as an elongator muscle to the *levator palpebræ*, with a disposition to remain relaxed while that muscle is contracted, but contracting when the elevator is tired. The natural contraction of the orbicularis is involuntary, the relaxation, both natural and occasional, is involuntary; but it has likewise a voluntary contraction and relaxation, which can be made to exceed the involuntary, resembling what is inherent in all the sphincters. To the remarks of Hunter, Mr Palmer has appended a note, stating that he sees no reason for supposing that the orbicularis is different from the other sphincters, or that it has a disposition to contract peculiar to itself. He says it is only peculiar in being antagonized by the *levator palpebræ*, which is a common voluntary muscle. On this point I have already fully expressed my opinion, and I trust proved the peculiar action it certainly possesses, both as a single and combined effort, agreeing with Hunter as to its peculiar disposition, although not in the details of its peculiarity.

A good article on this subject will be found in the Dub. Med. Journal by Mr Gabriel Stokes,[†] who clearly proves that the closure of the lids is not a mere passive condition from relaxation of the levator, as taught by Bichat, but that muscular agency is employed in its accomplishment. An interesting case is there detailed of paralysis of the *portio dura*, occasioning lagophthalmos, in which, as in similar cases, by no means so very uncommon, the upper eyelid assumes that position in which the force of gravity, unaided by muscular effort, would place it, and which I have already dwelt upon. With Sir C. Bell he remarks, that, during sleep, the eyeball is turned up, whilst the affected eye remains open ; in fact, the lower third of the eyeball is exposed in these cases by the dropping of the upper lid over the two upper thirds, and the white of the eye alone shows, from the more or less complete action of the inferior oblique. Mr Stokes considers the muscle as a true sphincter, for the reasons that it presents all the anatomical and physiological characters peculiar to such muscles, viz. a mixed function, the voluntary power being employed during a state of wakefulness, the involuntary during sleep, regarding the orbicular and palpebral portions as but one muscle possessed of a similar mixed function. In a former part of this paper I have given my own opinions on this subject, and my reasons for adopting them, and need therefore only remark, that, if correct, they tend to prove that some truth exists in these statements, and some that is incorrect.

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[*] Works by Palmer, Vol. iii. p. 147.

[†] Vol. xviii. p. 70, No. for September 1840.

The *levator palpebræ* is the proper antagonist of the orbicularis, and from its anatomical arrangement it exerts its influence on the whole extent of the tarsal cartilage at the same time. Its origin at the back of the orbit is pointed, and, as it extends forwards, spreads out in the form of a fan, its tendon being inserted into the whole length of the lower border of the tarsal cartilage. By its contraction the lid is raised simply. Its state of contraction corresponding to a condition of relaxation in the orbicularis, and *vice versa*. Its normal extent of contraction during a state of wakefulness is sufficient to keep the lid on a level with the upper margin of the pupil, but the lid is readily raised higher by a voluntary effort. When the eye is turned directly upwards by the contraction of the superior rectus, the levator co-operates, and the upper eyelid is raised proportionately.

During the hours of watchfulness, the levator continues in action unremittingly with momentary and occasional intermissions; but, as soon as the general system becomes wearied, a sensation of heaviness and weight is experienced in the lids, and, as sleep comes on, complete relaxation of the levator results, the eyelids are closed, the eyeball is turned upwards and outwards, and a power little more than tonicity retains them in apposition. On awaking complete relaxation is effected in the *orbicularis*, and the levator again resumes its contraction.

Such are the single and combined operation of the muscles of the eye and its appendages, with their uses and physiological employment in the animal economy. The author trusts, on a review of the subject, that the time expended in its consideration has been neither lost nor mis-spent, but that he has faithfully followed nature unprejudiced, and with an earnest desire for the establishment of truth.

In conclusion, I will briefly describe the combined or consensual employment of the two eyes, the object of which provision undoubtedly seems to be to insure the direction of those parts of the retina which, from habit, have become indentical in their sensations to the same part of an object at one and the same time.

As the muscles of a single eye and its appendages always maintain a definite relation to each other in the animal economy during a condition of health, so also do the globes always possess a mutual and definite relation to the motions, situation, and employments of each other during the continuance of their normal and connected condition of innervation, any departure from which destroys the correspondence of their axes, and, of course, originates strabismus. But under this abnormal condition their mutual harmony and connection in their respective situations and actions is not lost;—they still bear a definite relation to each other, and the eyeballs are moved, their axis still maintaining the same relative directions and the same relative situations to each other which they maintained whilst at rest, provided that the strabismus has been of sufficient duration to habituate this correspondence.

Such being the fact, that the globes are held in a definite mutual relation, it will be well to proceed and inquire more minutely into the various actions which the two eyeballs possess in common. Commencing with the obliqui, we find that the two inferior oblique muscles are employed conjointly, and the globes undergo the oblique rotation together during winking, voluntary and firm closure of the lids or sleep—when both globes are found rotated upwards and slightly outwards. The obliques of either eye act together during the adaptation of the organs for near-sight; but the two superior obliques act in unison under no other circumstances. If we make the experiment, we shall find it impossible to rotate both globes downwards and outwards at the same time, for, as I have before remarked, the axis of the globes are made to correspond under all its motions, as well as in a state of rest, and hence the two superior obliques could not act conjointly without destroying this correspondence. The two superior obliques, then, never act at one and the same time, except in conjunction with the inferior obliques; but when one globe is obliquely rotated downwards and outwards by one superior oblique, the fellow organ is at the same time rotated downwards and inwards to a corresponding extent by the internal and inferior recti muscles.

The superior, inferior, and internal recti act conjointly on the eyeballs, and thus both globes are elevated, depressed, drawn inwards, and moved in every intermediate position conjointly at one and the same time, although it behoves me to explain somewhat in relation to the internal recti. We find, indeed, that the internal recti act in concert imperfectly and with difficulty, inasmuch as it destroys the correspondence of the visual axis, acting normally in connection with an external rectus of the fellow organ, but may be made by an act of volition to correspond in its contraction with the fellow rectus. Although we possess this power, it is obviously an unnatural action, since we never thus combine their efforts in ordinary vision, and when combined voluntarily, it is difficult and unpleasant; besides, it for a time destroys the correspondence of their axis, and produces strabismus of both globes; hence we may infer that the two internal recti do not normally coöperate in their efforts, but that the proper connection is that of the internal of one eye with the external of the opposite organ. In ordinary vision, if one globe be turned outwards by the contraction of the *rectus externus*, the fellow organ is turned proportionately inwards by the contraction of the *rectus internus*; but, on the contrary, if we primarily employ the *rectus internus* of one eye to regard any object placed mesially, we find we cannot prevent the fellow organ from being directed to the same point; and hence the inference, that, if the *rectus externus* be employed, the *rectus internus* of the opposite eye co-operates; but if the internus be first employed, then it co-operates with its fellow, and not with the *rectus externus*. The two external recti never act conjointly; we find it quite impossible to turn both eyes outwards at the same time, nor can we, by any act of volition, destroy in this instance the correspondence of the visual axis. Are we to attribute this to the comparative defect of power which the external recti possess over the globe considered in relation to the internal? And hence the much greater frequency of convergent than divergent strabismus. Under all circumstances, therefore, during health, we find that the external rectus possesses no other action in combination with the opposite eye than that we have mentioned, viz. with the internal rectus, by which the two globes are maintained in the same mutual relation during all degrees of its contraction.

The *orbicularis palpebrarum* act naturally together, so that both lids are closed at the same time, although by a voluntary effort one may be employed separately; still it is difficult thus to separate their contractions completely; for if we try the experiment in our own persons we are conscious of a slight effort in the opposite muscle, whatever pains we take to try to suppress it.

The *levatores palpebrarum* cannot be separated in their contractions, and both lids are always raised at the same time, unless we prevent the effects of its action in one eye, by keeping the lids in apposition by a voluntary effort of the orbicularis. So beautiful are the contrivances stamped on nature by the Deity to adapt every movement to fulfil each indication in the most complete, the most useful, the most simple, and the most effectual manner.

15, *Southampton Street, Covent Garden.*

Art. IV.—*Cases of Gun-shot Wounds received in Canada in* 1838. By Thomas Stratton, M. D. Edin., Lic. Roy. Col. Surg. Ed., Navy Medical Department. In a Letter to Sir George Ballingall, M. D.

The following cases are part of the surgical fruits of an action which took place on the river St Lawrence and its British shore at Prescot, seventy-one miles below Kingston, on the 13th of November 1838. Winter being the season of Canadian discontent, some of the disaffected on the British side, went over to the United States, where they were joined by a number of low Catalines out of employment. The united rebels and sympathizers were about 400 in number, of whom 250 stealthily landed on the British shore; the remainder were beaten back by Queen's vessels, the action being one by land and water at the same time. Of the 250 who landed, 159 were taken prisoners and 50 were found killed; of the prisoners, some died of their wounds, about 15 were hanged, and the remainder, after some months confinement, were set at liberty.

In writing the following remarks my principal object is to note the amount of bodily exertion made by the individual immediately after receiving the wound,—a question which is interesting in medico-legal cases,—and to state the length of time under treatment. The first thirteen cases are marines and seamen of her Majesty's naval force on the Canadian waters; they were treated from the first by my friend, Surgeon Newman, Royal Navy, who has kindly permitted me to send you this account. Being at the time travelling in the western parts of the province, I did not see the wounded till ten days after the action. I then saw them daily during the rest of the time they were under treatment.

Case 1.—Robert Kershew, private, royal marines, aged 20, was wounded first in the thigh, fired two rounds, and then at 8 a. m. was struck by a musket-ball, which entered the right umbilical region; he fell down, and was carried 200 yards to a house for shelter, where, two hours after, he received surgical attention, and the ball, being felt superficial, was extracted on the left side of the third lumbar vertebra. While in the house there was great hemorrhage, he had several attacks of syncope, great dyspnœa and thirst; was then conveyed two miles over a rough road in a waggon, the motion of which gave him so much pain that it had to halt several times for his relief. At 5 p. m. was taken on board a steamer; had two bloody dejections; he arrived next morning at Kingston, where he expired at 10 a. m., twenty-six hours after being wounded.

In consequence of other duties the body was not examined.

If death had been in consequence of that depression of the heart's action which is sympathetic with severe injury of the peritoneum, the fatal event might have been expected sooner. In peritonitis from perforation of the intestines, death takes place generally in less time than twenty-six hours. By an autopsy it might have been ascertained whether the death of poor Kershew was from this cause or from hemorrhage; it appears more likely to have been from the former.

This case shows the necessity of spring-carriages for the conveyance of the wounded.

Case 2.—Thomas Burton, private, royal marines, aged 26. A musket-ball passed through the right side of the under lip, destroyed the third molar tooth, fractured and lodged in the inferior maxillary bone. There was considerable bleeding for about twenty minutes. Half-an hour after, the ball, quite torn up, was extracted from within the mouth, in doing which great force was required. 30th day, the wound in the lip is united, there is no wound within the mouth, no discharge, a large effusion of callus. Six weeks after, an offensive, bloody, and whitish discharge took place from the mouth. Two months after (January 13), he masticates a little, but on the left side only. When he attempts to masticate on the injured side, he feels great weakness in the jaw, and a soreness in the bone in the line of the fracture. In the tenth week he returned to duty.

Case 3.—John Chapman, corporal, royal marines, aged 24. A musket-ball entered the left elbow-joint in front, passing out behind a little higher up, and fracturing the outer condyle of the humerus. At the time, he was about twenty yards from the rebels; on being hit, his musket dropped out of his hand; he then walked two miles. Much hemorrhage followed for half an hour; felt qualmish for twelve hours after; there were two holes in the sleeve, the one where the ball entered was round, and that where it passed out was ragged. There was great constitutional excitement, requiring copious venesection, great swelling around the joint and crepitus, and copious discharge from both openings. Twelve or thirteen pieces of bone have been discharged at different times; for a day or two before these escaped, a pricking sensation was felt; no bits of cloth have been discharged. For the first seven weeks he kept his bed, and applied fomentations of hot water; after getting up, these were discontinued except occasionally at night; has made no use of cataplasms. For the first ten weeks considerable discharge from both openings. April 13, the entrance foramen has cicatrized; no discharge from the other; there are still some pieces of bone to come away; the hand is prone; can only half extend the fore-arm; general health good; feels occasionally a slight aching along the fore-arm, the day before a change of the weather to rain.

Case 4.—John Powel, private, royal marines, aged 31, when about twelve yards from the rebels, was struck by a musket-ball, which entered the right fore-arm at its ulnar edge, three inches from the wrist, reappeared at the middle of its palmar aspect, and then passed between the body and the arm, removing the skin from the inner side of the latter. He fired three rounds after the wound, of which he was not aware immediately on receiving it, first observing blood at his fingers ends; there was considerable bleeding for twenty minutes, and he felt faint for some time; the three shot holes in his jacket were very irregular. He kept his bed two days. Fomentations only were employed. There was hardly any discharge from the exit foramen, but much discharge for eight days from the entrance foramen; no pieces of bone have been discharged, but some bits of clothing have escaped at the exit foramen. On the 28th day he returned to his duty. April 16, The arm is the same as before the wound, except that it is a little weaker and smaller; there is no difference felt on change of weather. The cicatrix of the entrance foramen is slightly elevated; that of the exit foramen is of the natural height.

Case 5.—Richard Perry, private, royal marines, aged 28, was wounded first in the left thigh, fired two rounds, was then struck in the right thigh, when he went to the rear.

A musket-ball grazed and made a track five inches long on the inner and middle part of the right thigh; the breach in the trousers being of corresponding size and very ragged. The only treatment was simple dressing. There is no lameness in consequence of the wound; he cannot flex the leg so perfectly as before.

A musket-ball entered the fore part of the left thigh four inches above the knee, and passed out behind two inches higher up; considerable hemorrhage for some hours. After being wounded he walked 200 yards, and was then conveyed in a waggon, the jolting motion of which, as he was not accustomed to it, made him qualmish; the entry hole in the trousers was round, and the escape hole ragged. There was little constitutional irritation; he was confined to bed for three months, during which time he had cataplasms applied; no pieces of bone or of clothing have been discharged. April 16, The general health is good; some lameness of the left leg; the flexion is very imperfect and more so in the evening after walking about during the day; in cold wet weather there is slight aching in the site of the wound.

Case 6.—John Steevens, private, royal marines, aged 30, was struck by a musket-ball, which entered the outer and upper part of the right thigh, and then, after firing three rounds, he felt his leg stiff and retired; he got on horseback and walked the horse two miles, was not able to bear the motion of trotting; there was much hemorrhage for an hour, he felt qualmish, and had tremors for several hours; the shot hole in the trousers was round, not ragged. He was confined to bed for ten weeks, and had cataplasms applied; a large abscess formed in the groin and another afterwards in the right hypogastric region, the abscess-lancet being used five times. He was discharged from hospital in the fourteenth week with slight lameness, scarcely perceptible. The cicatrix of the wound is red in the centre, bluish towards the circumference, and on a level with the surrounding skin; twelve hours before rain an aching is felt down the fore-part of the thigh. As the shot hole in the trousers was perfectly round, and not ragged, it is probable that pieces of cloth were carried into the wound, but none have been observed to escape. As the ball has not been seen, his having been on horseback makes it possible that it fell out during the motion of riding, while suppuration taking place so far from where it entered, favours the supposition that it is still in the body. Before the above, a ball passed through part of Steevens' dress without his being aware of it at the time.

Case 7.—George Clackett, private, royal marines, aged 26. A musket-ball entered the left thigh in the inguinal triangle; he felt a shock, but did not know where he was wounded till he saw the blood; with assistance he limped a mile to a house for shelter; there was much bleeding for half-an hour; did not feel qualmish; the shot hole in the trousers was rounded. On the fifth day, an incision made half-way betwixt the anterior superior spinous process and the *trochanter major* gave exit to a quantity of black discharge, sulphuretted hydrogen gas, and a ball entirely torn up. He kept his bed two months, and during this time had cataplasms applied. The surgical wound soon united; from the musket wound, there was in the sixth month, about a drachm of whitish discharge daily. April 13, there is not much lameness; seven or eight pieces of clothing have escaped, which circumstance agrees with the roundness of the hole in the dress. As there was a superficial soreness betwixt the spot where the ball entered and where it was found, and, as no pieces of bone have yet been discharged, it seems likely that the missile did not perforate the ilium, but passed round its margin between the anterior spinous processes, while it having merely grazed the bone, makes it difficult to account for its shape being so entirely destroyed. That the wound is not yet healed up, probably arises from all the cloth not being yet discharged. In May he was sent to Britain with other invalids.

Case 8.—William Ward, private, royal marines, aged 40. A musket-ball entered the fore and middle part of the right thigh, the shock turning him round; he fired two rounds, and was then carried to the rear, not being able to walk; felt nausea for some time; the bleeding lasted six hours. On the third day the ball was cut out on the back of the thigh and nearer the knee, it was half-flattened, and the flattened part marked by lines as if from the femur. There has been copious discharge from both openings; great pain in the femur; great emaciation; he has had to struggle with lengthened attacks of vomiting and serous diarrhœa; no sweating. He kept his bed four months, and had cataplasms applied, which relieved the pain along the back of the thigh more than fomentations. In the fifth month he walks about on crutches, the flexion and extension of the leg being very limited.

Case 9.—Richard Whickam, private, royal marines, aged 24; a musket-ball entered opposite the right *trochanter major;* he fired three rounds, and then retired a mile on foot and another on horseback; the hemorrhage was slight; the shot hole in the trousers was round. Large abscesses formed around the wound, for which four incisions at different times were required; for four months a very great discharge took place; and he had copious night sweats, sleeplessness, great emaciation, and hectic flush. Had wine and Edinburgh ale, and for two months had an opiate every night. In the fifth month the discharge became reduced to about three ounces in the twenty-four hours from the original wound, and a small quantity from two of the four incisions made for abscesses. He now sleeps pretty well at night without any opiate. Continues to take forty minims of diluted sulphuric acid at night; sweats a little towards morning; never had any diarrhœa; appetite pretty good; sits up in bed half-an hour a-day. April 13, six or seven pieces of bone and none of cloth have passed out with the discharge. There is no pain on flexion or rotation of the thigh; at times, on sudden motion, there is pain at the inner part of the knee. The ball has not been seen, and is supposed to have fallen out when riding. In May he was sent home with the other invalids.

Case 10.—William Millar, private, royal marines, aged 33; when two yards from the rebels, was struck by a musket-ball, which entered three inches above the *malleolus externus* of the left fibula. With assistance he walked two miles to the rear. There was much bleeding for twenty minutes; great swelling followed, and some time after the ball was discovered on the opposite side of the leg. Cataplasms, fomentations, and the water-dressing were severally employed without any apparent difference of effect. In the seventh week he returned to his duty. After much exercise a little swelling takes place. 2d March 1842, the ball is now nearly in the same spot, but a little lower down; he feels no inconvenience from it in walking or running, but a pricking sensation when wet weather sets in. He has no wish to have the ball extracted, as he suffers no inconvenience from it. It has now been in the position specified three years and five months.

The other day Mr Winder, late surgeon to the militia at Hamilton (Canada), informed me that last month Dr Campbell, his successor there, performed amputation above the knee in the case of a pensioner of the 50th Regiment, who was wounded in 1813. He was very much reduced, and was suffering from hectic, when a change for the better immediately followed the operation. The ball was imbedded in the tibia, in which situation it had been for twenty-nine years.

Case 11.—James Humm, corporal, royal marines, aged 20; a musket-ball passed through the proximal phalanx of the middle finger of the left hand, leaving entire the soft parts on the radial side of the finger. After receiving the wound he was able to bayonet his assailant. In the sixth week he returned to his duty with the joint stiff, the finger three times the natural size, and somewhat in his way when handling his musket.

The next two wounds were accidents.

Case 12.—Samuel Wade, seaman, aged 22, on board H. M. steamer Experiment, whilst working a gun, the left carpus and metacarpus were destroyed from explosion whilst in the act of loading, the vent not being properly stopped. Amputation was immediately performed, and his recovery was speedy.

Case 13.—John Macdiarmid, seaman, aged 24, on board the same vessel; the distal and middle phalanges of the middle, ring, and little fingers of the left hand were destroyed while working a gun, the hand having got between the recoil and the gun-slide. Amputation was performed at the proximal phalanges.

The preceding cases were several times seen by Mr Chisholm and Dr Dassauville, Royal Artillery; Dr Home, Hospital Staff; Mr Nicol, 65th Regiment; Mr Gardner and Dr Maitland, 83d Regiment; Dr Hallowell and Mr Robison.

Some of the wounds of the dress were a little curious. In one instance, that of an officer, the ball entered opposite one nipple, and passed out opposite the other, perforating the coat, vest, and flannel shirt. It seemed to have glanced off the starched front of the shirt, which was not perforated, and there was no mark on the skin.

William Magnell, serjeant-major, royal marines, felt his forage-cap shake a little on his head, and, looking at it, he saw that a musket-ball has passed through its side and crown, and also through a book, he had in it, (the duty-roster), containing the names of the company. Another ball cut a piece, two inches long, out of his jacket sleeve, and a third passed through his musket-sling.

Samuel Farrell, private, royal marines, after the action, observed two ragged holes in his jacket, one opposite the left nipple, and the other four inches distant in a line downwards and backwards. The ball where it seemed to have entered shot away a part of his cross-belt.

The names which follow are those of some of the wounded found among the pirates or rebels after they were taken prisoners. They were under the care of Mr Robison of Kingston. The wounded prisoners were pardoned, without any trial, on the 18th of April, and were sent to the United States on the 20th. The first case mentioned below anticipated the day, the unfortunate man dying on the 19th.

CASE 14.—Frederick Melo, a German, aged 35, was struck by a musket-ball, which perforated the middle of the right thigh, fracturing the femur. He was perfectly unmanageable, and would not allow himself to be handled, so that hardly any treatment was employed. February 13, (three months after), the thigh is shortened four inches, and is about a fourth thicker than the left; the wounds in the soft parts are healed; he is confined to bed in consequence of ascites and anasarca, of which he died on the 19th of April. This case shows the result of *no treatment*, and the amount of shortening in a fractured femur, when it is left to itself.

CASE 15—Oliver Aubrey, aged 20; a ball entered the left hip, five inches external to, and in a line with, the anus, and passed out close to the great trochanter of the right femur; pieces of cloth were discharged at the exit-foramen, none at the entrance-foramen; he was able to flex and extend the thigh; could lie on his face only, not able to sit or to lie on his back. February 13, (three months after), he cannot sit on anything hard; otherwise well; the wounds are healed; the edges of both much inverted. April 2, slight pain down the outer part of the right thigh, none down the left; he can now sit on a hard seat without much inconvenience.

CASE 16.—Jacques Herod, aged 37; a musket-ball entered the right thigh, six inches above, and in a line with the internal condyle, and was extracted on the opposite side, three inches above the external condyle; he was confined to bed ten weeks. February 13, no pieces of bone have been discharged; extension and flexion of the leg are not at all perfect.

CASE 17.—Orson Rogers, aged 34; a ball entered the anterior and middle part of the right thigh. On the second day, the ball was extracted on the back part of the limb by Mr Scott. In the fourth week, half-way between the two openings, the shell of the ball was cut out by Mr Robison. February 13 (three months after), five pieces of bone have been discharged; he walks about perfectly well; the thigh appears to be shortened about half-an-inch; he feels pain before and during the commencement of rainy weather.

CASE 18.—Hiram Colton, aged 23; a ball passed through the left fibula near its lower extremity; he began to walk about in the tenth week.

CASE 19.—Seleh Evans, aged 27, received a flesh-wound four inches in length, about the middle of the left leg; he was able to walk from the time of the injury.

Case 20.—Giles Thomas, aged 34; a musket-ball passed through the left fibula, three inches below its head; there was but little constitutional irritation after it; he kept his bed for nine weeks, and then began to walk about a little; flexion and extension of the leg are very much impaired.

Case 20.—Philip Alger, aged 35; a musket-ball entered below the right knee, and lodged. On the tenth day the ball was extracted, and with it came three inches of the tibia. The ball was cut nearly in two, the halves being connected by a thin bit of lead; great swelling of the leg with profuse discharge from it, followed with diarrhœa and hectic irritation, so that in the fifth week Mr Robison performed amputation above the knee, and the patient's recovery was rapid. On examining the leg, the tibia had a longitudinal fracture in its whole length; the fibula was not injured.

Case 22.—Lorenzo E. Phinney, aged 20; a musket-ball entered opposite the sternal extremity of the second false rib, and passed out six inches farther back betwixt the fourth and fifth false ribs on the right side; he was several times freely bled to relieve orthopnœa, cough and great pain on inspiring, coughing and sternutation; several pieces of cloth have been discharged at the entrance-foramen. February 13, (three months after), there is deep-seated pain where the ball entered; no cough. April 2, there occasionally is pain in the site of the wound, and in the corresponding part of the left side of the chest; there is very little cough; on coughing, speaking loud, and reading aloud for any length of time, there is pain at the *scrobiculus cordis.*

Phinney is of delicate make; some of his relations are consumptive; and his case may eventually resemble those where, in a soil ready prepared by hereditary predisposition, some accidental injury to the chest sows the seeds of tubercular phthisis.

Remarks.—In the tenth case (Millar), the ball was allowed to remain, and though not giving any uneasiness at present, it may do so at some future time, if he receive a blow on that part. The instance appended to it of the discharged soldier, who, twenty-nine years after being wounded, required to have his leg amputated, shows the propriety of always extracting the ball at the time, as, if this had been done, he would not have been required thus to pay a leg-instalment of the debt of nature.

Cataplasms, fomentations, and water-dressing were severally employed: the first of these some of the wounded felt more agreeable than the fomentations; and it was for the most part, in such instances only, that they were employed. After a few days are over, the dressing most agreeable to the patient is a bit of lint dipped in cold water, and Mackintosh cloth or oil-skin over it, to keep it from drying, the dressing being changed every twenty-four hours.

When the bullet-holes in the clothes are round, it is likely that bits of cloth have been carried into the wound where, if the ball lodges, they remain and keep the wound open longer; if the ball passes through, they may either remain or pass out before the missile; sometimes the holes are ragged, and when the edges are put together, it is evident that no cloth had been carried into the wound. The nearer to his assailants, the more perfect is the hole made in the soldier's dress, and the more likely that part of it has entered before the ball.

The lameness in some of the patients was becoming a little less every week.

Kingston, Canada, March 1842.

ART. V.—*On the Physiological and Medicinal Properties of Bromine and its Compounds; also on the Analogies between the Physiological and Medicinal Properties of these Bodies, and those of Chlorine and Iodine, with their Correspondent Compounds; being the Harveian Prize Essay for* 1842. By R. M. GLOVER, M. D. Edinburgh, Newcastle on Tyne. (Concluded from p. 141.)

PHYSIOLOGICAL PROPERTIES OF THE BROMIDES OF POTASSIUM AND SODIUM.

IT may be proper to remark, in the first place, that these salts have little action of a corrosive character. Solution of albumen is faintly troubled by the bromide of potassium in contact with it. The solutions of both salts added to the blood give a brighter colour to this fluid.

M. Barthez reports that the bromide of potassium resembles the iodide of the same base. He found it kill dogs when injected into the jugular, coagulating the blood, and causing convulsions. He introduced a drachm of the salt into the stomach of a dog without any ill effect, except vomiting. But two drachms, and even a drachm and a-half, killed dogs in three days when retained in the stomach by a ligature of the gullet, with marks of inflammation of the gastro-intestinal mucous membrane. Maillet gave two ounces to a dog without any ill effect; and he observes, according to the principle, that the dose of a saline substance for the horse should be eight times that for the dog, that a pound of the bromide of potassium would have no ill effect on a horse.*

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* Pereira, Mat. Med., 1st ed., part i. p. 287.

Devergie was accustomed to state in his lectures, that an idiosyncrasy on the part of dogs affected the action of this substance on their stomachs. But this notion apparently arose from an expectation of finding more active properties in the bromide than in the iodide of potassium.

The bromide of potassium is often impure; I have found it adulterated with one-third its weight of the chloride. There are three methods by which this adulteration may be detected. One is given by Pereira, quoted from Rose (Ann. de Pharmacie, t. 23.) "If pure bromide of potassium mixed with excess of bichromate of potass be distilled with concentrated sulphuric acid in a tubulated retort, to which is adapted a receiver, containing excess of solution of caustic ammonia, pure bromine distils over, and the ammoniacal liquid remains perfectly colourless. But if the bromide contained a chloride, both bromine and the chloride of chromium distil over, and the ammoniacal liquid becomes yellow. Chromic acid may be detected in the solution by the usual tests." Another method of detecting a mixture of a choride with a bromide is that of M. Caillot,* and consists in mixing the salt with equal parts of persulphate of mercury, and peroxide of manganese, and heating until decomposition; then on adding a few drops of a solution of chromate of potass, if the chloride of mercury be present, red spots will appear, due solely to the decomposition of the chromate by the chloride. On this head, the following is extracted from the third part of Professor Kane's new work;—"The commercial article is frequently adulterated with chloride of potassium, the presence of which may be detected as follows: Dissolve 100 grains of the salt in four ounces of water, and decompose it by an excess of nitrate of silver, collect the precipitate, wash it carefully, and dry it in a capsule till it ceases to lose weight, then weigh it. If it were perfectly pure, the bromide of silver should weigh 158.8 grains; but the presence of chloride of potassium would have the effect, from the smaller equivalent of chlorine, of increasing the weight; therefore, if the precipitate, when quite dry, weighs more than 158.8 grains, the sample is impure, and the quantity of chloride present may be calculated from the overplus weight, for 100 grains of the chloride of potassium should give 192.6 grains of precipitate. Thus, if there were 10 per cent. of impurity, the precipitate should weigh 162 grains, if 20 per cent., it should weigh 165.4. Thus the precipitate increases in weight about 3.3 for each 10 per cent. of chloride present."

Expt. 23d. Forty grains of the bromide of potassium dissolved in half-an-ounce (by measure) of water, were injected into the jugular of a large and strong old greyhound dog. A tetanic spasm was produced, with tumultuous and irregular action of the heart and discharge of urine and fæces. Twenty minutes after the operation, he appeared quite recovered. Eighty grains dissolved in the same quantity of water were then injected. There was sudden cessation of the motion of the heart, and of the respiration, along with a tetanic spasm (opisthotonos,) which lasted about a minute and a-half, and was attended with disengagement of urine. After this had subsided, he drew two deep inspirations; a universal trembling of the muscles took place, and lasted for three minutes and some seconds,* when every other sign of life had disappeared.

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* Ann. de Chim., t. 45.

The chest was immediately opened; the voluntary muscles contracted on being cut; the lungs collapsed on opening the chest; the heart was without motion; and had lost its irritability in less than two minutes after death. This organ was gorged with clotted blood, red in the left ventricle, and dark-coloured in the right. The lungs appeared quite healthy, the tips of the rugæ of the stomach were somewhat redder than natural.

Expt. 24th. A middle-sized French poodle-dog had sixty grains of the bromide of potassium dissolved in half a fluid ounce of water injected into the jugular. The symptoms were stertorous breathing, escape of urine and fæces, tumultuous and irregular action of the heart, which suddenly ceased, frothing at the mouth, cries, dilated pupil, and death before the animal could be untied, or in about two minutes from the injection of the salt.

On inspection, the voluntary muscles contracted strongly on being cut; five minutes after death, the heart had lost its irritability, and was gorged with fluid blood, red in the left ventricle. The lungs were quite healthy.

Expt. 25th. A middle-sized messet bitch had twenty grains of the salt dissolved in a fluid drachm and a-half of water injected into her jugular. Death took place in forty or fifty seconds. The symptoms were sudden cessation of the heart's action, preceded by a few stertorous respirations, escape of urine and fæces, and dilated pupil. The heart was found to have lost its irritability, and to be gorged with blood, which was fluid in the right ventricle, red and coagulated in the left.

Expt. 26th. A hæmadynamometer was connected with the femoral artery of a middle-sized, strong, and lively terrier dog; and sixty grains of the salt dissolved in half an ounce of water (by measure) were injected into the carotid in the direction of the heart. Previously to this, the mercury was raised two inches and eight lines. As the solution was introduced, the pressure in the instrument was augmented, and when the whole of the salt had entered, the mercury had risen to five inches. This elevation was only for a minute, during which period the oscillations were also greater, owing perhaps to the struggles and hard breathing of the animal. After a minute the mercury suddenly fell below the former level, and continued to fall until, in about two minutes and twenty seconds, all pressure in the arterial system seemed removed: death then took place in about two minutes and a-half from the period at which the salt began to be injected. The animal voided urine and fæces during the experiment, and seemed spasmodically agitated. On inspecting the chest, much the same appearances were observed as in those experiments where the salt was injected into the jugular. The brain was healthy.

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* This appears to be a similar phenomenon to that described by Mr Blake as produced by salts of oxide of lead, strontia, and baryta. I have observed it most remarkable in rabbits poisoned by cyanide of ammonium.

Expt. 27th. Forty grains of the salt dissolved in three fluid drachms of water were injected into the femoral artery of a lively terrier-bitch in the direction of the circulation. Spasmodic extension of the limb was followed by spasmodic action of the muscles of the chest, and by extension of the other limbs, with excited action of the heart and dilated pupil. This state lasted for about five minutes, and then subsided.

Expt. 28th. One hundred grains of the bromide of potassium dissolved in three drachms of water were introduced through a flexible tube into the stomach of a strong male rabbit. Five minutes after the operation he fell flat on his belly; loss of power over the hind legs became apparent, and he made ineffectual efforts to crawl. The breathing became quicker than natural, embarrassed and abdominal; the action of the heart irregular and feeble. This state continued for half an hour, during which time fæces twice escaped, and the iris seemed paralysed. His eyelids winked; a stroke appeared to excite convulsive strikings out of the limbs. Towards the close of the half hour he seemed greatly agitated, and recovered for a short time the use of his limbs. After this his head was moved forwards and backwards with great velocity, and the body bent in a crouching form while he stood on his legs. He was then agitated with convulsions, (both emprosthotonos and opisthotonos.) At length he fell on his side. In this position similar rapid movements of the fore legs were observed to those which occurred in rabbits poisoned by bromine. These movements lasted for a minute, when he lay apparently insensible, and died after a few deep inspirations.

Inspection.—The muscles contracted feebly on being cut. The auricles contracted feebly; ventricles did not move nor respond to the stimulus of the knife two minutes after death. The peristaltic action continued. Lungs greatly congested toward the dependent part, and contained much frothy serum. Pericardium contained serum; blood dark-coloured and fluid in both cavities of the heart. The stomach was contracted towards the pylorus, loose at the cardiac extremity. On washing this organ the epithelium came off. The mucous membrane over the cardiac portion was softened, gray, but dotted with numerous purple ecchymoses. Beneath, the muscular tunic was greatly congested. There were two large bloody patches—one where the œsophagus enters the stomach—the other at the lower portion of the cardiac sac. The upper part of the small intestines exhibited appearances approaching those of the stomach. The lower part of the liver was darker coloured than natural. The membranes of the spinal chord showed marks of congestion, and there was some effusion of serum into the ventricles of the brain. The bladder was full. Bromine existed in the blood, liver, and urine.

Remarks.—These experiments appear sufficient to enable us to compare the operation of the bromide with that of the iodide of potassium, as shown by analogous experiments. According to Mr Blake, the salts of potass, when injected into the veins, destroy the irritability of the heart, and when introduced into the arteries obstruct the circulation through the systemic capillaries.* The experiments just related prove both these properties to be possessed by the bromide of potassium. In one of the cases where the salt was thrown into the jugular, the blood was fluid in both cavities. Death then was owing to destruction of the heart's irritability. In experiment 26th we see the salt first obstruct the systemic capillaries, and then, when it reaches the heart, we have destruction of the heart's irritability as in those cases where the poison was introduced at once into the organ. The convulsions which occurred when the salt was introduced into the circulation might be owing to the sudden arrestment of the circulation, or to a specific action of the salt on the nervous system.

Expt. 27th shows the effect of the salt in causing muscular contractions.

All these effects are very similar to the properties eliminated in similar experiments from hydriodate of potass; although no experiment exactly similar to my 26th and 27th experiments is on record as performed with this latter salt.

Devergie observed oscillations of the fibres of the tongue after death, in a dog killed by injection of the iodide of potassium into the jugular. These oscillations might correspond to the muscular contractions related in experiment 23d.

The experiment on the rabbit shows a very similar action on the stomach of this animal to that described by Dr Cogswell, as possessed by the iodide, "Several small coagula of blood were scattered over the inner surface, and the lining membrane itself was penetrated with crowds of small bloody extravasations bordered by brownish red areolæ."†

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* Edin. Med. and Surg. Journal, July 1, 1841, p. 123.

† Cogswell on Iodine.

I had made some experiments with an impure bromide before my attention was drawn to its adulteration.

A mongrel dog had a drachm and a-half of the impure salt introduced into his stomach. This was at mid-day. During the ensuing night he was much purged. The same dose was given every day for a week; he became thinner and lost power over his limbs to some extent, but retained his appetite. A drachm of the salt introduced into the cellular tissue on the back of a rabbit produced much local irritation. Three drachms of it killed a rabbit in less than an hour and a-half, with symptoms which, so far as were observed, resembled those related in experiment 28th, and, with very similar morbid appearances, similar purple patches of ecchymosis being found in the stomach.

The physiological effects produced by the salt in small doses, on man for example, are exceedingly obscure. It acts as a diuretic; in some cases it occasions diarrhœa, and possesses somewhat of that action on the secretions and excretions which renders the corresponding iodide so powerful as a deobstruent. Here I may refer to the second part of this paper, in which the medicinal properties of the bodies are to be related.

The bromide of potassium is evidently less powerful than the iodide of the same base; the chloride is by no means devoid of the properties which its analogous bodies possess. I found fifty grains of the chloride dissolved in half an ounce of water capable of killing a dog when injected into the jugular, with symptoms closely resembling those produced by the allied bodies, the heart's irritability being destroyed.

Expt. 29th. The hæmadynamometer was connected with the femoral artery of a lively cocker-dog; and fifty grains of the bromide of sodium, dissolved in two drachms of water, were injected into the jugular. The mercury, whose highest mark was two and three-quarter inches, fell immediately to the level, and remained there for from fifty to sixty seconds, no oscillations being distinguishable. In a minute after the operation, the column began to rise, and soon regained its former level, the oscillations less frequent, but stronger than before the operation, Four minutes after the operation, the heart's action seemed quite restored, and he was set loose. He had completely lost the power of moving his limbs, but evidently retained consciousness. The pupil was dilated. The heart's action became synchronous with the respiration; being 54 in the minute. An hour after the operation he remained much in the same state, but gradually recovered.

Expt. 30th. One hundred grains of the same salt, dissolved in three fluid drachms of water, were injected into the jugular of a lively terrier bitch rather larger than the subject of the preceding experiment. The only symptom produced appeared to be excessively quickened and excited action of the heart. The animal on being set loose appeared lively and excited.

Remarks.—The bromide of sodium appears to bear a close resemblance to common salt in physiological properties. Its taste is exactly like that of common salt, nor does it appear to be much more energetic. The iodide of sodium seems, however, to be not destitute of activity.[*]

PHYSIOLOGICAL PROPERTIES OF THE BROMIDE AND IODIDE OF BARIUM.

These salts are included under the same head, because I am not aware of any experiments on either of them having been published. They both crystallize in needles. According to Berzelius, the crystals of the bromide have no resemblance to those of the chloride, which I presume means that they never affect the tabular form.

Expt. 31*st.* A scruple of the bromide of barium, dissolved in a small quantity of water, was injected into the stomach of a stout male rabbit. At the end of the first minute after the operation, the heart's action was feeble and irregular, and respiration hurried. In two minutes, loss of power over the voluntary muscles was perceptible; and ineffectual efforts to crawl were made. Towards the third minute, the animal kept moving its head from side to side. Between the fourth and fifth minute, a violent convulsion occurred, which flung the animal from a table on which it was placed. After this there were few signs of life, and these were altogether absent towards the seventh minute.

Inspection immediately.—Legs outstretched; neck rigid. There was but slight contractility of the voluntary muscles, and that of the heart was extinct. The peristaltic movement of the intestines was also absent. The blood in the great veins was of a treackly consistence; the jugular was full of blood. The blood was dark and partly coagulated in both sides of the heart. Lungs somewhat congested; as were the membranes of the brain. The stomach was vascular externally; the mucous membrane was red and softened at the cardiac extremity.

Expt. 32*d.* Six grains of the iodide of barium, dissolved in two fluid drachms of water, were injected into the stomach of a stout male rabbit at seven o'clock in the evening. For two hours and a half no effect except disinclination to move was manifest. Next morning at nine o'clock he was found lying on his belly making ineffectual efforts to crawl; fæces had been passed during the night. The heart's action was very feeble; respiration natural; pupils dilated, and the iris not affected by light. The eyelids closed when touched, and the animal appeared to possess consciousness. The most remarkable phenomena were, convulsive strikings out of the limbs, tremors of the neck and shoulders, with occasional grinding of the teeth, and violent shaking of the head from side to side. On pricking the anus reflex phenomena were excited. At seven P. M., this state still continued, but the pupil was contracted. The temperature of the animal was now very low. He died at half-past eight.

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[*] Christison on Poisons, p. 605.

On inspection, the state of the muscular system was the same as in the subject of the preceding experiment, but the irritability of the heart was not altogether absent. The left ventricle was empty. Peristaltic motion of the intestines continued. The mucous membrane of the stomach was rose-red at the cardia, and softened; its epithelium was removed, and some small dark patches of extravasation appeared at the surface. The small intestines appeared healthy; the colon contained fæces, and the bladder was full. The membranes of the brain and cord were congested, and there was considerable softening of the substance of the cerebellum and spinal chord.

Remark.—These experiments show that the bromide and iodide of barium possess the physiological properties of the class of salts to which they belong, and in particular, closely resemble the chloride of the same base.

PHYSIOLOGICAL PROPERTIES OF THE BROMIDE OF MAGNESIUM.

Expt. 33*d*. Three drachms of this salt, dissolved in a fluid ounce of water, were given to a stout rabbit.

Symptoms. Violent and irregular muscular contractions, chiefly affecting the muscles of the neck; feebleness; slowness of the respiration, with slow and weak action of the heart; death took place in eight minutes. The chief appearances on inspection were slight corrosion and reddening of the gastric mucous membrane.

Expt. 34*th*. Another rabbit had a drachm and a-half of the same salt dissolved in three fluid drachms of water injected into the stomach: No immediate effect was perceived. But although he took his food, debility gradually came on, and he was found dead on the third day after the operation. The epithelium of the stomach was removed, and the mucous membrane softened. Near the pylorus was a small oval slough with a raised border, and here there was a reddish coloration through to the peritoneal coat of the viscus. The small intestines exhibited several patches of inflammation; and the kidneys, liver, and membranes of the brain were congested.

Remarks.—There seems every reason for concluding that this compound of magnesium participates in the general physiological action of the magnesian salts. Although this body is much less active than the bromide of zinc, yet the effect on the stomach, as displayed in the experiment just related, and also the general depression produced, resemble exceedingly the action of this more powerful salt when similarly administered. Mr Blake shows that the magnesian salts when introduced into the blood give rise to phenomena very similar to those brought about by the salts of zinc applied in that way.

PHYSIOLOGICAL PROPERTIES OF THE BROMIDE OF ZINC.

This salt is deliquescent as well as the chloride, to which, as to the iodide, it bears a close chemical resemblance. It is capable of coagulating albumen and solution of the colouring matter of the blood, to which it gives the brick-red tint produced by other salts of the same base. It is a compound of some interest in a physiological point of view.

Expt. 35th. Half a drachm of the salt, dissolved in two measured drachms of water, was injected into the jugular of a middle-sized, lively, and strong mongrel dog. The entrance of the fluid was followed by spasmodic dilatation of the chest, sudden cessation of the heart's action, and convulsive tremors of the limbs, with discharge of urine and fæces. On unbinding the animal, it was found dead in about two minutes from the time at which the operation was performed. The chest was immediately opened. The heart was found without motion, and gorged with blood, but, on irritating the organ with the point of a scalpel, feeble contractions were excited. The blood was perfectly fluid in both ventricles, florid in the left. The lungs were congested, and contained much froth. The voluntary muscles contracted on being cut.

Expt. 36th. Half a drachm of the salt, dissolved in three fluid drachms of water, was injected into the carotid artery of a strong mongrel bitch, in the direction of the heart, a haemadynamometer being connected with the femoral artery. As the injection was slowly made, the mercury, which oscillated at from three and a half to four inches above the level, gradually rose to six and a quarter inches. It continued at this height for a minute and a half, the oscillations being greater. It then fell to two inches, but speedily rose, and oscillated slowly for five minutes at nearly the elevation it had attained before the salt was injected. It then fell, and remained without movement. An universal spasm with escape of urine preceded death.

Three and a half minutes after death the heart was without motion, but contracted on being irritated. It was gorged with fluid blood, which was red in the left cavity, and of a lighter colour than usual in the right side. The lungs were affected with vesicular emphysema, and did not appear much congested. The voluntary muscles contracted on being cut.

Expt. 37*th.* A mongrel dog had fifty grains of the bromide dissolved in three measured drachms of water injected into his stomach by a flexible tube.

Symptoms.—Excessive vomiting and purging, with great prostration of strength. Recovery nine hours after the operation.

Expt. 38*th.* Sixty grains of the salt dissolved in half a fluid ounce of water were injected into the stomach of a stout rabbit. This was at six P. M. The respiration continued more frequent during the remainder of the evening. At six A. M. next day the animal was found dead; the legs outstretched; teeth closely set, and body very rigid.

The lungs were found dotted with congested spots, and much frothy serum exuded on cutting their tissue. About half an ounce of serum by measure was effused into the chest. The right side of the heart contained dark fluid blood; the left side was empty. The peritoneum contained a little serum; the bladder was full. The greater part of the stomach was in a state of decomposition. There was difficulty in washing it without removing the villous coat, which over the cardiac portion was completely softened and blackened, as in a state of gangrene. The epithelium was removed from the pyloric portion, which, as well as the small intestines, had little suffered. The surface of the liver touching the stomach was corroded.

Bromine was detected in the blood and heart, and in the corroded liver.

Remarks.—It thus appears that the bromide of zinc, when thrown into the venous system, puts a stop to the motions of the heart without, however, totally destroying the irritability of the organ; and that, when this salt is introduced so as to pass through the systemic capillaries before reaching the heart, it obstructs them temporarily, but exerts its deleterious influence on the central organ of the circulation when it arrives there in quantity.

Mr Blake states that he found sulphate of zinc without the property of obstructing the arterial systemic circulation. But the bromide appears to be a more active corrosive than the sulphate. I take this opportunity of saying a word with regard to the influences on the pulmonic and systemic capillaries, and on the heart's irritability, ascribed to many salts by this writer, and employed by him as differential tests or criteria. Those salts which obstruct the circulation through the systemic capillaries are, I think, capable of producing the same effect on the pulmonic vessels, unless they have also the power of arresting the heart's action. Should they produce this effect on the heart, the velocity of the flow of blood towards the lung is soon diminished, and the circulation arrested before congestion of the lungs can occur. Thus, when we introduce substances capable of so affecting the heart into the jugular, we find no congestion of the lung produced, but sudden cessation of the heart's action. And we may suppose a dose of the salt large enough to congest the pulmonic capillaries, to be capable of putting a stop to the motions of the heart, *i. e.* where such a power is possessed. Moreover, I think that all irritants, and especially corrosive substances of the saline class, have more or less the power of obstructing the capillaries, when introduced so as to circulate directly to them.

Dr Cogswell found the heart of a dog, into whose jugular he had injected the iodide of zinc, in a state similar to that described in experiment 35th. The organ was gorged with blood, fluid in both ventricles, and red in the left; it was without motion when the chest was opened, but contracted on being irritated.* Experiment 38th bears a great resemblance to an experiment related by the same author, on the effects of the iodide introduced in the same dose as I employed of the bromide, also into the stomach of a rabbit.†

From the effects observed in experiment 37th, where the salt was introduced into the stomach of a dog, there can be but little doubt of the participation of this salt in the general action exerted by the salts of its class on the stomach and intestines when not in excessive or poisonous dose. In short, sufficient has been brought forward to enable the body to be brought under the general head of zincoid compounds as regards physiological properties.

PHYSIOLOGICAL PROPERTIES OF THE BROMIDE OF IRON.

This substance resembles the preceding salt in its action on albumen.

Expt. 39th. Forty grains of the bromide of iron dissolved in three fluid drachms of water, were injected into the jugular of a cur bitch, of middle size and strength. The operation was followed by cries, convulsive struggles, voiding of the urine and fæces, irregularity of the heart's action, and laborious respiration. On being set loose she lay quiet for a few minutes, and then tried to pass fæces. A quarter of an hour after the operation the respirations were 72, panting, and the heart's action feeble. After this, tremors frequently occurred; fluid stools were passed; and saliva flowed. The respirations became less frequent, the heart's action feeble, and the general appearance of the animal denoted great weakness. An hour after the operation she vomited. After this, moaning and tenesmus; great efforts of the muscles of respiration; fæces and urine often discharged. The urine contained both bromine and iron. Death took place at the expiration of three hours and a-quarter, being preceded by great prostration of strength and slow and difficult respiration.

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* Cogswell on Iodine, p. 153.

† Op. cit. pp. 149–50.

On inspection there were strong contractions of the muscles; five minutes after death the heart's motion had ceased, and the organ could not be irritated; the peristaltic motion of the intestines continued. The blood in both sides of the heart was dark and fluid. There was some effusion of serum into the pericardium and pleuræ. The lungs showed marks of congestion; the intestinal veins, and those of the liver and spleen were engorged; the whole mucous membrane of the intestinal tube, from the stomach to the rectum, was affected; the villous coat of the stomach presented a violet tinge, gradually deepening towards the pylorus, and along the duodenum; the affection became greater in descending to the lower part of the canal; the jejunum and ilium had their villous coat of a deep purple hue, contained a large quantity of grumous blood, showed the Peyerian patches remarkably distinct and swollen, and several deep-coloured ecchymoses. The rectum was vascular, corrugated, and mottled with dark patches.

Expt. 40*th.* Forty grains dissolved in half-an ounce by measure of water were injected into the stomach of a stout rabbit. This was at six P. M. Next day, at eleven A. M., there was feebleness of the heart's action, and panting respiration; animal able to move. At three P. M. he was found lying on his side; heart's action scarcely perceptible; respiration slow; pupil greatly dilated. Death took place at four P. M.

Inspection.—The muscles contracted; not so the heart three minutes after death; peristaltic motion went on. Blood accumulated in the right side of heart; lungs slightly congested; stomach contained some food, and was greatly distended with flatus; the mucous membrane at the pylorus was pretty healthy; that of the cardiac portion showed the epithelium removed, and was softened in several places, especially around a number of irregular patches of a brownish hue, which had a gritty feel; the small intestines were healthy; the sigmoid flexure and colon empty; bladder full of dark-coloured urine.

On analyzing the stomach, its coats were found to afford evidence of containing iron, but not bromine; both the elements were found in the urine.

Remarks.—These experiments establish the analogy of the bromide of iron with other salts of the same base, and more particularly with the iodide, as its effects are shown in Dr Cogswell's thirteenth and fifteenth experiments. When injected into the veins it appears, as far as can be made out without the aid of the hæmadynamometer, to obstruct the pulmonary circulation, and weaken the action of the heart; when these effects are in some degree subsided, a powerful secondary action on the intestinal canal becomes apparent.

When I come to speak of the medicinal properties of this salt, I shall have to relate some of its less striking physiological properties.

In experiment 40th, the salt appears to have undergone decomposition in the stomach, the oxide of iron being retained there.

PHYSIOLOGICAL PROPERTIES OF THE BROMIDE AND SUB-BROMIDE OF MERCURY.

These salts bear the most remarkable resemblance in chemical properties to the chloride and subchloride, to which also their physiological affinity is strict.

Expt. 41*st.* A scruple of the bromide, wrapped in blotting-paper, was pushed by a bougie into the stomach of a stout male rabbit, a little water being thrown into the stomach afterwards. In two minutes the respirations became fifteen in the minute. Inspiration was apparently made with great difficulty. The heart's action was quickened, being at the rate of 200 beats per minute, and enfeebled. The animal remained in this state till the end of the sixth minute, all the time on his legs, but apparently in a state of stupefaction. At this period he made an attempt to run, but was seized with convulsions, and fell on his side. Several convulsive movements of the whole body followed, and he died in about seven minutes from the operation.

The most remarkable circumstance on inspection was the solidification of the blood in the right side of the heart and veins, along with effusion of the fluid parts into the cavities of the pleuræ and ventricles of the brain. The muscular contractility remained, as did the peristaltic action after death, though the heart's irritability was gone.

Expt. 42*d.* Two and a-half grains of the bromide dissolved in two measured drachms of water were injected into the jugular of a lively and strong terrier bitch.

Effects.—Feebleness and irregularity of the heart's action; tetanic spasm lasting about a minute; slow and spasmodic respiration; attempts to vomit; tremors of the limbs; dilated pupil. Death took place in three minutes from the time the salt entered.

On inspection, the voluntary muscles contracted when cut; the heart's action had ceased, but the organ contracted when irritated, three and a-half minutes after death. The peristaltic action continued; lungs congested; bronchi filled with frothy serum. Right side of the heart gorged with blood, showing here and there brick-red spots; left side moderately distended with blood somewhat darker than natural.

Remarks.—The solidification of the blood in experiment 41st could not be a chemical phenomenon; because such is not the character of the chemical action of the bromide of mercury on blood. I performed several repetitions of this experiment—some before Dr Lonsdale and Mr Skae; but although I have seen a treackly appearance of the blood produced, I never again saw this curious phenomenon. I do not allude to the solidification alone, but to the connection of this with effusion of the serum. As these experiments may be supposed to show the analogy of the bromide with the chloride, the following experiments were made with the chloride, in order to elucidate some points of doubt with regard to both salts.

Expt. 43d. Half an ounce of corrosive sublimate was introduced into the stomach of a strong terrier, and the gullet tied. The animal died in an hour. The mucous membrane of the stomach was found of a nearly uniform colour—of a blue slate tint, with scarcely a trace of vital action; but in the duodenum, and still more in the small intestines, where the quantity of the poison was diminished, there were abundant marks of vital action, *i. e.* irritation. The heart and about eight ounces of blood carefully collected from the great veins were digested for two days in nitric acid, successive portions of the acid being added. The mass was then set aside for a week, and a fresh digestion made. Then the acid liquid filtered through asbestos was heated to expel acid, water being repeatedly added. The solution was then carefully neutralized by pure caustic potass. When the point of neutralization had been nearly attained, each addition of caustic potass caused a faint lemon-coloured precipitate, which was speedily redissolved. On adding the carbonate instead of the alkali, a distinct red tint was assumed, which disappeared when the effervescence had ceased. I divided the liquid into three portions: one portion was evaporated to dryness, and strongly heated in a tube of Bohemian glass; protochloride of tin was added to another portion; a third portion was exposed to the action of tin-foil, which became dull.

Results. The first process gave very faint evidence of the presence of mercury; the protochloride gave a faint gray precipitate; the tin-foil on being heated did not give any perceptible mercurial vapour. As the reagents were pure, notwithstanding the imperfect evidence of the reduction test, there could be no doubt that the blood acted on by the nitric acid contained mercury, probably in the state of pernitrate and corrosive sublimate.*

Since I gave in my essay containing this fact, for competition for the Harveian prize, M. Orfila has established the absorption of corrosive sublimate in the most satisfactory manner. His memoir is published in the Journal de Chimie Medicale for July; I performed the experiment just related in October 1840, assisted by my friend, Dr Embleton.

Expt. 44th. Ten grains of corrosive sublimate dissolved in half a fluid ounce of water, being thrown into the jugular of a dog, produced almost instant death, the heart's irritability being destroyed.

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* The sub-bromide, like the subchloride, is converted by digestion in nitric acid into the bromide and nitrate, or per-bromide and per-nitrate, according to the nomenclature preferred.

Expt. 45*th.* Five grains of the same substance, dissolved in the same quantity of water, were injected into the carotid of a stout terrier bitch in the direction of the heart, the hæmadynamometer being connected with the femoral artery. The effect of the salt in obstructing the circulation through the capillaries was manifest; this obstruction was overcome in between two or three minutes; and the pressure in the instrument was diminished. On setting the animal loose, she lay on her side; the respiration of a spasmodic character, but the heart beating regularly; the eyelids closed, and no manifestation of consciousness; the limbs rigid, and tail bent backwards. She continued in this state for half an hour, when death took place, with no other previous symptom than relaxation of the sphincters.

On examination, the heart had no irritability five minutes after death; the blood was fluid and dark in both ventricles; the lungs appeared healthy. The membranes of the brain, especially at the base, were very vascular; the cortical substance of the brain was of a livid colour for about two and a-half lines from its margin, round the whole circumference of the organ, on section of which numerous dark spots were observable. The surface of the spinal cord throughout its extent showed the same lividity; the membranes were also vascular, and bloody serum was effused into the theca. The peristaltic action continued; there was some vascularity of the rugæ of the stomach.

A French writer has insisted much on the greater mildness of the physiological action of the bromide in comparison with that of the chloride.* I am willing to believe that its effects are not quite so great as those of the formidable and well known salt, not so much from actual observation, which will scarcely bear out so nice a distinction, as from more general considerations. To come to the point at once, I am induced to frame a law to the effect, that, among chlorides, bromides, and iodides of electro-positive metals, the iodide is the most active physiologically, then the bromide, and lastly the chloride; but this law is inverted when we get to the electro-negative metals, and their haloid salts. There the chloride is the most active, then the bromide, and lastly the iodide; thus in all cases the activity will be as the solubility of the salt, and as its facility of decomposition, according to what has been said of the affinities of chlorine, bromine, and iodine for electro-positive and electro-negative substances in the introductory part of this paper.

By way of example, the chlorides, bromides, and iodides of potassium and sodium may be cited in support of one part of the proposition, the chloride, and red iodide of mercury, in support of the other. But, as a still more marked example in support of the latter part of the proposition, take the chloride and iodide of platinum. I found the former of these salts introduced in solution in a dose of ten grains into the stomach of a rabbit, to give rise to prostration of strength, slimy stools, abdominal respiration, finally death in six hours, preceded by great feebleness of the heart's action. After death the stomach exhibited a uniform brownish-gray corrosion over the cardiac portion. But the iodide in a dose of fifteen grains, similarly administered to another rabbit,* produced no effect.

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* M. A. Bonnet (*Bulletin General de Therapeutique*, Juilet 1837) maintains that the bromide is less apt than the chloride, during a long administration, to occasion pains of the head, chest, and abdomen.

The sub-bromide is strictly analogous to calomel in physiological properties.

Before concluding these observations on the action of the saline compounds of bromine, I may remark that we are yet completely in the dark whether any substances can obstruct the capillary circulation, but such as are capable of exerting a chemical action on the vessels or their contents.

PHYSIOLOGICAL PROPERTIES OF THE BROMIDE OF CYANOGEN.

Expt. 46*th.* Five grains of this compound, prepared according to the process given by Berzelius,† were dissolved in half an ounce by measure of distilled water, and injected into the jugular of a strong terrier bitch; she shrieked and struggled; a spasm of opisthotonos occurred, which lasted about a minute, during which the urine was discharged. The heart beat two or three times; and on complete relaxation from the spasm, the animal was dead.

The voluntary muscles contracted on being cut, the heart was without motion five minutes after death, but contracted on being irritated; the peristaltic action continued. The lungs displayed marks of congestion. The blood was foundof its usual colour in both cavities, and partially coagulated.

Expt. 47*th.* Two grains of the same body dissolved in the same quantity of water as above were similarly administered to another dog. A tetanic spasm followed, attended with discharge of urine and fæces, and cessation of the heart's action and respiration for about a minute. The animal recovered, apparently without having sustained any permanent injury.

Expt. 48*th.* Ten grains of the substance were dissolved in two fluid drachms of water, and poured down the throat of a remarkably strong terrier dog. He immediately broke loose from those who were holding him, and rushed violently about, uttering frightful cries. This lasted about a minute, when he fell suddenly on his side, and lay apparently without consciousness; no respiration audible, although the heart beat slowly and feebly. This state lasted for two minutes and some seconds. He then began to respire, at first slowly, and with much muscular effort. For half an hour he lay stretched out in a spasmodic state; the legs stiff, and tail extended. The respirations gradually became quicker and more forcible. Towards the close of the period mentioned, they were 120 in the minute, and made with a loud rattle chiefly attending inspiration. The heart during the same time beat slowly and forcibly at about half the frequency of the respirations. The eyes were dull; the pupils dilated; the eyelids winked occasionally. During the time that he was in this state, he twice voided urine, and seemed insensible to several mechanical stimuli applied. The symptoms became gradually milder, but during the next forty minutes were still of a similar character. At the end of this time he got on his legs, having previously manifested symptoms of returning sensibility. He then vomited a quantity of slimy matter. He staggered and reeled in attempting to stand. The symptoms of affection of the nervous system subsided, but in their place signs of the most extensive and excessive irritation came on. The respiration continued husky and laborious; the animal was debilitated to the last degree. Bloody foam issued from the mouth, to which there was constantly a large portion adherent. Large quantities of blood were vomited along with the shreds of mucous membrane. Bloody stools were passed. The great original strength of the animal enabled it to live for several hours in this dreadful state, when at last it was spined.

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† *I. e.* supended in water.

† After Serullas; see Traité de Chimie, t. i. p. 345.

On inspection, the appearances of irritation were most extensive. The lungs were congested in several spots, and the bronchi filled with a mixture of bloody mucus and frothy serum. The mucous membrane of the trachea and part of the bronchi was removed. The lining membrane of the gullet was softened and dotted with ecchymoses. The outer surface of the stomach was intensely vascular; and its villous coat appeared as if soaked in blood; black tarry blood occupied the spaces between the rugae, which were very prominent. This state continued more or less intense throughout the entire length of the intestines. The membranes of the brain and spinal cord were vascular, and several bloody spots were visible on section of the former organ.

Expt. 49th. Five grains of the bromide dissolved in the same quantity of water as above were introduced into the stomach of another terrier, in order that the effects of antidotes might be tried. When the spasm appeared commencing he was treated with the cold affusion, and solution of ammonia applied to his nostrils. The effect of these remedies in recovering him was apparent. The dose of the bromide was repeated; symptoms of irritant poisoning came on, similar to those with which the subject of the preceding experiment was affected. The dog was hanged eight hours after the second operation. The bronchi and trachea did not show those excessive marks of irritation visible in the former case, but the digestive tube was in a similar state. Several singularly well-defined abrasions of the mucous membrane were visible in the stomach.*

Expts. 50th and 51st. In these experiments the bromide was injected into the peritoneum and stomach of rabbits, with the effect of producing death, attended by all the symptoms of speedy poisoning by prussic acid. In one case the irritability of the heart was extinguished, and the contractility of the voluntary muscles rendered very slight. The substance, judging from the diffusion of its odour, appeared to penetrate the tissues rapidly.

Expt. 52d. Thirty minims of the liquid ammonia of the P. L. strength mixed with seven fluid drachms of water being introduced into the stomach of each of two rabbits; one of the animals had five grains of the bromide dissolved in a fluid drachm of water injected into its stomach immediately after. Instead of being killed in less than a minute, as would certainly have been the case, but for the ammonia, it lived five minutes, without any symptom, and then was seized with the characteristic convulsions. But after all motion of the heart and lungs had ceased, a curious set of muscular tremors or vibrations commenced, affecting especially the muscles of the chest, and continued for not less than from ten to twelve minutes. This effect I ascribe to the action of the cyanide of ammonium formed by the resolution of the bromide of cyanogen into that salt and the bromide of ammonium. The other rabbit lived about twenty-four hours.

Remarks.—The bromide of cyanogen appears to possess two kinds of action; one on the spinal cord—perhaps primarily on the sympathetic system, closely resembling the primary effect of prussic acid. But the secondary or irritant action far exceeds in intensity that of prussic acid, and probably that of any known irritant. This body has little corrosive power, it coagulates white of egg but slowly, and is as nearly as possible a pure irritant in its secondary action. In the 48th experiment, the great irritation exercised on the respiratory passages was probably owing to some of the poison having entered them. Ammonia cannot be useful as a chemical antidote either to this body or to prussic acid; neither can chlorine be otherwise beneficial than as a stimulus, for, according to Serullas, the chlorocyanic acid is no whit inferior in activity to the compound whose effects we have just seen. The iodide of cyanogen appears to be nearly as powerful as either of the other bodies.†

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* This is the stomach represented in Plate IV.

† Magendie has admitted this body into his formulary.

PHYSIOLOGICAL PROPERTIES OF THE BROMIDE AND CHLORIDE OF OLEFIANT-GAS, OF BROMOFORM, CHLOROFORM, AND IODOFORM.

The only experiment on an animal with any of this class of bodies is one related by Dr Cogswell with iodoform, which he terms sesquiodide of carbon, but which we now know to be a compound of three atoms of iodine with one of formyl. The curious results of this experiment led me to investigate this class of bodies which, from the results of my experiments, appear to form a new class of poisons, and to be possessed of properties not unlikely to be beneficial in the treatment of disease.

The composition of these bodies, taking the compounds of chlorine as examples, is $C_4\ H_3\ Chl. + H\,Chl.$ for the chloride of olefiant gas; and $C_2\ H\ Chl_3$ for chloroform.

In the investigation of the properties of these bodies, I shall first show the striking resemblance in leading characters among the members of the group, and then take chloroform as an example of some of their more minute properties.

Expt. 53d. Thirty minims of the chloride of olefiant gas were introduced into the jugular of a small but lively mongrel dog eight months old. Immediately the animal commenced a series of short barking yells, each of which was synchronous with expiration. Before the operation the respirations were 48; after it they became 68 in the minute; expiration made with great effort of the abdominal muscles. The heart's action was quickened and irregular, but masked by the state of the respiration. From the first he lost all power of locomotion, but retained consciousness. In twenty minutes, his chest being pressed with a view to auscultation, he redoubled the barking yells. He was now placed near the fire, where he remained lying on his side; the eyelids at first half-closed. Large bubbles could be heard in the chest, and there was a clacking noise in the mouth proceeding from movements of the soft palate. In an hour and a-quarter from the operation, he made an effort to get on his legs, and succeeded, but speedily fell again on his side, and lay in this position. At this time the respirations were 82, and distinct crepitations could be heard. The bubbles continued of the same extensive character. A singular phenomenon appeared about the second hour. This was a suspension of the respiration during a period of fifteen seconds, the length of which never varied, but which occurred at irregular intervals, on the average, at every half-minute. This suspension might be a protracted expiration. The respirations gradually became slower, the heart's action imperceptible; the animal heat declined rapidly; towards the third hour, a little before death, the temperature was 63° in the axilla, 72° in the groin, and 82° in the rectum; the temperature of the room being 62°.

Inspection.—The mouth was open and tongue pendent; the smell of the chloride, which had been felt in the breath almost as soon as the substance was introduced into the jugular, still remained at the mouth. The voluntary muscles contracted when cut; five minutes after death the heart had no irritability. Peristaltic movement of the intestines continued. Nearly an ounce by measure of bloody serum was found in each pleura. The right side of the heart contained a little fluid blood; left side nearly empty. The left lung was so black and engorged as to surpass any pathological state previously witnessed by Dr R. Elliot or myself. The organ was only crepitant in one or two spots near the entrance of the bronchi. The texture was easily broken down, and the whole might be described as one vast apoplectic spot. The right lung presented a very similar state. On cutting into the pulmonary tissue much blood and bloody froth issued; the latter filled the bronchi. The membranes of the brain and spinal cord were vascular; section of the brain showed several bloody spots.

Expt. 54th. This experiment, with the bromide of olefiant gas, was the first that I tried with this class of bodies, and I employed an unnecessarily large dose of the substance. Three measured drachms of the substance were injected into the jugular of a healthy female ass of eleven months old. On the entrance of the fluid the respirations were quickened, and the animal was seized with a short dry cough. The heart's action became quick, at first irregular, then very feeble. A few convulsive movements of the limbs took place, the cough was exchanged for a kind of husky expiration, and death took place within three minutes from the operation. In about thirty seconds after the substance entered, its smell was perceptible in the expired air.

The inspection was immediately made. The voluntary muscles contracted strongly; the heart was without motion, and did not contract when irritated. The blood in both the cavities was somewhat frothy and mixed with large masses of coagula. In the left ventricle was found a mass of clear coagulated lymph. The lungs were in many parts of a light purple colour, but their lower border almost black. Everywhere they were scattered with congested spots. Towards the lower part the tissue was broken down in many parts, and saturated with blood. The bronchi contained a large quantity of frothy serum, and their lining membrane was deeply injected. The organs of the nervous system showed no morbid appearances. The smell of the compound was perceptible directly the chest was opened.

Expt. 55th. Forty minims of the chloride were introduced into the stomach of a stout male rabbit. Immediately after the operation symptoms similar to those observed in experiment 53d came on. For the first forty minutes the respiration might be styled asthmatic, inspiration being quick and expiration protracted, and made with a wheezing noise. During this time the heart's action was quick, feeble, and irregular; the pupil dilated, and iris little contractile; the eyes suffused with watery fluid. There was great loss of power over the voluntary muscles. He partly recovered from this state, but was found dead ten and a-half hours after the operation.

Inspection.—Body very rigid; jaws firmly closed; nose and mouth bloody. The principal internal appearances were congestion of the lungs, dark fluid blood in both sides of the heart, and pink-coloured froth in the bronchi, with slight congestion of the brain, and softening of the gastric mucous membrane, which was dotted here and there with dark spots.

Expt. 56th. Fifty minims of the bromide were introduced into the stomach of a suitable rabbit. The effects closely resembled those described in the former experiment. Although the power of locomotion was gone consciousness remained. Death took place in two hours, being preceded by convulsive movements of the head and fore legs, and twitchings of the upper lip. In this case the body was opened immediately after death. The voluntary muscles contracted very feebly; the auricles were contracting, and contractions of the ventricles could be excited by stimulation. The peristaltic action went on. The odour of the poison was perceptible in the muscles, and in fact everywhere throughout the body. Similar appearances were found in the chest to those described in the preceding experiments. The membranes of the brain and spinal cord were healthy. The stomach had its mucous membrane blackened over the cardiac portion, especially towards the greater curvature; here and there were purple patches surrounded by flakes of mucus; there were also marks of congestion. The organ was quite flaccid. The upper part of the small intestines was affected as the stomach.

Expts. 57th and *58th.* In the former of these experiments sixty minims of chloroform killed a poodle dog when injected into the jugular, in forty-five seconds, with symptoms similar to those occasioned in experiment 54th. In the 58th experiment, twice the quantity killed a large dog of Newfoundland and greyhound breed, with about the same degree of rapidity, and much the same symptoms. In both cases when the chest was opened, with the least possible delay, the heart was found gorged with clotted blood and its irritability destroyed. The muscles of voluntary motion contracted after death, and the peristaltic action went on. The lungs were congested to a surprising degree, and the bronchi filled with frothy serum.

Expts. 59th and *60th* were performed on rabbits, into whose stomachs chloroform and bromoform were introduced, when effects were produced similar to those resulting from the similar administration of the chloride and bromide of olefiant gas.

Expt 61*st.* A bitch full grown, between the beagle and pointer, was the subject of this experiment. Thirty minims of chloroform were injected into the jugular vein, a hæmadynamometer being connected with the femoral artery. In three or four seconds after the chloroform was introduced, the mercury fell from six inches above the level at which it had been oscillating, in a minute and a-half it had fallen to an inch, the heart's pulsations were manifested regularly during the descent, and were slower and more regular than before the operation. At the lower level, the oscillations became more considerable, sometimes carrying the mercury up to three inches, owing probably to struggles and expiratory efforts. In about two minutes the mercury began to rise, and attained the level of two inches. It continued to oscillate more regularly from this to a few lines higher, until ten minutes after the operation, when the animal was unbound; she was in a state of excessive prostration, but gradually recovered.

Expt. 62*d.* Sixty minims of chloroform were very slowly injected into the jugular of a large shepherd's dog.

Symptoms.—Irregular and hurried action of the heart; struggles; quick and forcible expiration, accompanied with a short bark; dilatation of the pupil; discharge of urine, and a temporary spasm, during which he was bent backwards. All this took place in two minutes. After this he lay still for three minutes; no respiration perceptible; the heart's action excessively feeble. He then began to breathe again, and gradually recovered, the recovery being attended for some time with great disorder of the respiration, loss of power over the voluntary muscles, and great prostration. Next day he was unwilling to move, and the respiration continued laborious. Four days after the operation he was poisoned by prussic acid, when the lungs were found to retain marks of the great congestion produced by this class of poisons.

Expt 63*d.* The same quantity of chloroform as in the preceding experiment was injected into the carotid of a lame pointer bitch, in the direction of the circulation. No struggle followed the injection of the fluid. A forcible inspiration, succeeded by a single expiration, ensued. The urine was voided. The heart continued to beat feebly, when every other sign of life was extinct. The animal was quite dead in a minute and a half.

The chest was immediately opened. The muscles contracted strongly on being cut. The heart, which was gorged on its right side, relieved itself of some of its contents on incision being made into it; the left side contained dark-coloured fluid blood. The lungs had collapsed on opening the chest, and seemed quite healthy. The membranes of the brain were much congested; there was much serum in the ventricles; and bloody serum at the base of the brain.

Expt. 64*th.* Sixty minims of chloroform were injected into the peritoneal cavity of a large male rabbit. Death ensued in seventeen minutes.

Symptoms.—Slight transitory excitement; loss of power over the limbs; profound coma; excessively dilated pupil; heart's action feeble; great excitement of the respiration and dilatation of the chest; a few slight movements of the limbs synchronous with the respiration. No motion could be excited by pricking or pinching the limbs; nor did the eyelids move on approaching an object to the eye. He passed urine a few minutes before death.

Inspection.—Small intestines greatly congested externally, and their coats hardened where the chloroform had touched; a large oval ecchymosis, which might equal the superficies of a half-crown, was visible between the muscular and peritoneal coats of the stomach. On cutting into the chest, the lungs collapsed, but contained much dark-coloured blood. The heart had dark blood in both its cavities, and retained its irritability. The peristaltic action was stopped; and the voluntary muscles had little contractility. The brain was healthy; the smell of chloroform was distinct in the chest and in the urine passed a few minutes before death.

Expt. 65*th.* Sixty minims of chloroform, in this experiment, killed a rabbit in half an hour when injected into the stomach. The symptoms were first those of action on the spinal cord, or primarily possibly on the sympathetic system; the respiration became affected, and coma supervened.

After death the mucous membrane of the stomach was found white and corroded near the œsophagus; over the rest of the cardiac portion dotted with purple patches of ecchymosis. The epithelium was removed from the pyloric portion and the mucous membrane reddened.

In other experiments with this substance on rabbits, the animals which recovered from the primary effects of its introduction into the stomach were sometimes found to die of the acute gastritis thus induced.

Remarks.—Great resemblance exists among the properties of this class of bodies which appear to form a new order of poisonous substances, uniting in themselves physiological properties which are not found united in any other known class of poisons. The distinguishing characteristics are first, the remarkable power they possess of obstructing the pulmonic circulation, whether they are injected into the veins or introduced into the stomach; then the action on the spinal cord and afterwards on the brain; and lastly, the corrosive and irritant action exercised on the stomach. In the case where chloroform was injected into the carotid, death appears to have been produced by the loss of nervous action consequent on the direct action of the poison on the brain. This effect might be accounted for by the obstruction to the flow of blood through the capillaries of this organ thus induced. The mechanical properties of this class of bodies may peculiarly fit them for obstructing the circulation through the lungs. It was shown, for instance, that, when injected into the jugular, their smell is almost instantly perceptible in the expired air, so that the vapour getting into the air-cells may place the blood much in contact with the substance. The action on the spinal cord is very different from that of strychnia, to which my friend Dr Cogswell compared it in the case of iodoform. Strychnia destroys the influence of the will over the muscles, but appears to excite the spinal cord, which loses its sensibility under the action of this class of poisons. The blackening of the mucous membrane of the stomach which these substances produce is another curious property. This effect appears to be compounded of the corrosive and irritant action of the poison, its effects on the colouring matter of the blood, and that congestion of dark blood found in the stomach in certain cases of coma.

Where the poison was introduced directly into the circulation, we had the heart's action put a stop to, and its irritability destroyed, where the dose was large. In other cases a smaller dose caused obstruction to the flow of blood through the lungs, while the heart's action continued; and in one case this obstruction was shown by the haemadynamometer. In that case the pressure in the arterial system was diminished, but the heart's action continued.

The difference between the action of iodoform and that of the other members of the group, is, that this body produces the peculiar effects more slowly, owing, doubtless, to its solid form.*

The whole group have a surprising power of penetrating the tissues. Dr Cogswell found iodine where iodoform was given into the stomach, after death, in the blood, brain, and muscles; and I have observed the most distinct smell of the substances to a similar extent.

PART II.—MEDICINAL PROPERTIES OF BROMINE AND ITS COMPOUNDS.

Bromine was first used as a medicinal agent by M. Pourché, a townsman of Balard. Previous to this, a person named Desorgues, calling himself *simple magistrat*, had written to the Academy of Medicine, proposing the employment of bromide of mercury in the treatment of syphilis.

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* I have used iodoform with great benefit externally in many obstinate skin affections, such as *lepra*, *psoriasis*, chronic eczema; and internally with benefit in a very old case of bronchocele, and in scrofulous enlargements of the glands. I gave it in doses of two grains thrice a-day in pill, with mucilage and bread crumb; externally, in the form of an ointment of half-a drachm to the ounce of simple cerate. I believe that this may prove one of the most valuable remedies that we have.

M. Bonnet, in a paper published in the ***Bulletin Géneral de Therapeutique***, July 1837, gives a complete digest of what had been then observed in France with regard to the medicinal uses of bromine and its compounds. He refers to the researches of M. Pourché. In a case of scrofulous enlargement of the glands of the neck in a woman of 22 years of age, who had been affected for seven years, a cure was effected in three months by the external and internal use of bromine. At first six drops dissolved in three ounces of water were given in the day, in three doses. Next day, ten drops were given. In ten days, the dose was increased to fourteen drops daily, and at last to thirty drops in the same quantity of water. Cataplasms, moistened with solution of bromine, were applied to the swellings. The same physician had great success in the treatment of scrofula by the internal and external use of the hydrobromate of potass.

M. Bonnet attributes great advantages to the bromide and subbromide of mercury, as constitutional remedies in comparison with corrosive sublimate and calomel. He states, that the sub-bromide has less action than calomel on the salivary glands, and more effect on the urinary secretion; that the former substance is therefore preferable where the idiosyncrasy of the patients renders them liable to salivation. After stating that the bromide is less soluble in water than the chloride, he recommends a solution in ether for medicinal use, and gives the observations of an Austrian physician, which prove the antisyphilitic virtues of the remedy, and contends that it is not so liable as corrosive sublimate to affect the head, chest, and stomach during its medicinal use.

In the cases of M. Fournet, already referred to, the therapeutic action of the bromine is exceedingly obscure. Frictions of bromine to the swollen articulations appear to have been useful, but as their application was conjoined with alkaline baths, and, moreover, the bromine was mixed with alcohol, which would soon change it into bromal and hydrobromic ether, these cases prove very little.

Magendie employs bromine and its preparations in scrofula, amenorrhœa, and in hypertrophy of the ventricles. He expresses his conviction that future observation will establish the great therapeutic powers of bromine.

Dr Williams has used the bromide of potassium with success in cases of enlarged spleen. The first case which he gives is that of a boy, aged 14, admitted into St Thomas' Hospital on the 13th of September 1833. Both the liver and spleen were enormously enlarged. Their edge was hard, and substance unyielding. The abdomen contained much fluid; the countenance was sallow and emaciated; the legs dropsical; belly protuberant. The prognosis was most unfavourable. After unsuccessful trial of the supertartrate of potass and iodide of potassium, the iodide of mercury was used. This last remedy removed the dropsy, but the liver and spleen remained enlarged. On the 13th of May, the patient commenced with a grain thrice a day of the bromide of potassium, which dose was gradually increased to four grains. On the 10th of July he became slightly jaundiced. From apprehension that the bromide might have caused this, he had doses of the sulphate of magnesia instead until the jaundice had disappeared, when, on the 11th of August, the bromide was recommenced in four grain doses. On the 15th, the dose was increased to five grains thrice a day, and continued for fourteen months. Under this treatment, he gradually improved, and was dismissed with the liver and spleen only one-third of their former size.

In a second case of enlarged spleen with ascites, in a woman aged 30, the bromide could not be given in larger doses than four grains three times a day, on account of its tendency to disorder the bowels. After nine months treatment by the bromide, she was dismissed with the spleen still above the natural size. Dr Williams gives two more cases in which the results were of the same character

I shall give a summary of my own results.

Case I.—Eczema of the legs and arms in a married woman aged 40, of strumous habits, the mother of a large family. The disease, an inveterate form of eczema, had lasted a twelvemonth ; for six months she had been under the care of Mr Brady of Gateshead, who had tried a variety of remedies without success. The eruption became moist every morning about three o'clock, and continued so for an hour, it then turned dry, and was accompanied by heat, redness, and itching. A saturated solution of bromine mixed with water until it ceased to give pain, and applied by means of lint and oil-skin, caused a decided improvement to take place. In two months the patient was cured.

Case II.—Specific ulcers of the legs of long standing. This was a case treated in the Edinburgh Infirmary under the care of Dr Handyside. The man, aged 22, had been suffering for thirteen years from the effects of a kick of a horse, which had produced lacerated wounds on the anterior surface of the tibiæ at their middle third. According to his own account these never entirely healed. On admission, there were several small ill-conditioned sores over the seat of the former injury. From the 9th of May to the 20th of June, various metallic washes were applied to the ulcers without success. -Then, the ulcers were treated with a strong etherial solution of bromine, which acted as a caustic, and lint steeped in saturated solution of bromine placed over them, covered with oil-skin. Next day the same process was repeated. The application produced pain and intense redness, and after the second time was not repeated. The ulcers healed rapidly afterwards, and cicatrization took place.

Case III.—A case of carbuncle, under the care of Mr Bennett of Gateshead, which after resisting the hydriodate of potass used externally and internally, was cured by the external use of a solution of bromine—forty minims to the pint of water—in between six and seven weeks. Mr Bennett has used the lotion of bromine with success in many cases of skin affections, and in a case of purpura.

Case IV.—Anomalous syphilitic tubercles of the legs. This was a strong man of 36 years of age, who had been affected with syphilitic and mercurial symptoms for eight years. For six years, he had a discoloration of the skin of the right fore-arm and left thigh, accompanied with pain of the bones at night. For several years, swellings have formed on these parts, which broke, leaving deep ill-conditioned ulcerations. The case was under the care of Mr Dawson of this town, who commenced the treatment on the 14th of May 1841. At first, the lotion of bromine—ten minims to the pint, was employed for a month, with the effect of cleaning the ulcers, and removing the discoloration, in a great degree; after this, he had an ointment composed of eight minims of bromine, and half a drachm of the bromide of potassium to an ounce of lard, which was ordered to be well rubbed on daily. Under this application, without internal treatment, the sores had healed, and the discoloration was removed by the 15th of December. Previous to the commencement of the treatment, the disease had a very formidable appearance.

Case V.—Sarcomatous tumour of the knee, of about the size of an apple, spongy, not painful, in a woman aged 44; removed in a month by frictions of an ointment composed of thirty minims of bromine and a drachm of the bromide of potassium to an ounce of lard.

Case VI.—Purulent ophthalmia in a child, where Mr Brown of Jarrow substituted a lotion of bromide of potassium, three grains to the ounce, with success, for the sulphate of zinc previously added.

Case VII.—Scrofulous ulcer of the leg in a boy aged 12. Admitted into the Newcastle Infirmary under the care of Sir J. Fife, July 5th 1839. A large foul scrofulous ulcer occupied nearly the whole of the inner aspect of the left leg. There was a similar ulcer of the size of a half-crown on the back of the right wrist. There was great pain in the ulcer of the leg, the appetite was bad, and he slept little. The sore on the leg had lasted for three years. Tonics and hydriodate of potass internally were conjoined with the external use of creosote and ioduretted solution of hydriodate of potass. No benefit was produced. In the beginning of December, the bones of the leg and carpus were obviously diseased, and symptoms of hectic appeared. The hydriodate of potass was again tried; no benefit was derived, and the lotion of bromine in the dose of forty minims to the pint of water was applied externally three times a-day by means of lint and oil skin, while the bromide of potassium was given internally.

Under this treatment the ulcers assumed a more healthy aspect, and gradually diminished in size, while their fœtor and pain were lessened. In six weeks the ulcer on the leg was nearly healed; that on the wrist continued open. He was then made an out-patient, and died in the course of the winter, I understand, of diabetes. The bromide of potassium was at first given in the dose of three grains thrice daily in pill. After three days this dose was increased to four grains, and so every three days until twenty-four grains were taken daily. Under this treatment the appetite improved, the night-sweats diminished, and the urine increased in quantity. Bromine was several times found in the urine during the treatment.

Cases VIII. IX. X. and XI.—These were cases of malignant ulcer of the face, and syphilitic ulcers, where the bromide of mercury was employed internally in the dose of the eighth of a grain thrice a-day, while the solution of bromine of the strength described in the preceding case was used externally. All the patients were men, and the cases were observed in the Newcastle Infirmary. The syphilitic ulcers rapidly healed, but during the internal treatment in three of the cases, symptoms of physiological action were observed exactly like those of corrosive sublimate. Very severe head, chest, and stomach affections were produced. The case of malignant ulcer was somewhat improved, and in this case, although the urine was increased in quantity during a treatment of a month, no head, chest, nor stomach affection was observed. There was slight salivation.

Case XIII.—Mesenteric tumour in a weaver aged 22, Edinburgh Infirmary. Here the bromide of iron was used internally without success, so far as the swelling was concerned, but with improvement of the appetite. The dose was twelve grains in twenty pills, two morning and evening, from the 12th to the 21st of August 1840.

Case XIV.—Here the bromide of potassium was employed internally in a case of scrofulous enlargement of the glands of the neck in a pitman aged 19, the same salt with bromine being used externally in the form of ointment. Five grains of the salt were given internally every three hours; and the ointment was composed of thirty minims of bromine, and a drachm of the salt to the ounce of lard, and rubbed on thrice a-day. In three weeks the glands were reduced to a third of their size, and some pain which had been felt in the throat was no longer experienced; then the glands began to suppurate; the internal treatment produced no constitutional effect. I owe this case to Mr Brown of Jarrow.

Case XV.—Scrofulous enlargement of the glands of the neck in a girl aged 16, treated by the bromide of iron internally, and ointment of bromine and hydrobromate of potass externally. The internal remedy was given in the dose of forty drops of a solution of one drachm in two fluid ounces of water twice a-day; the external application was of the same strength as in the preceding case. The treatment was continued from the 22d of June 1841, to the 11th of August, when the general health was much improved, but little effect had been produced on the tumours.

Case XVI.—Hypertrophy of the submaxillary gland in a youth aged 18. Treatment and result similar to that in the preceding case. The internal remedy caused some degree of diarrhœa.

Case XVII.—Case of rupia treated by lotion of bromine externally, and the bromide of iron internally. The patient, aged 23, was treated in the Newcastle Infirmary by Dr Cargill. While the sores of one leg were treated by the lotion of bromine of the strength of forty minims to the pint, those of the other leg had nitrate of silver applied; the superiority of the latter application was very evident. The bromine produced soreness, and a serous exudation from the ulcers; the ointment of nitrate of silver, on the other hand, only caused temporary pain, and was soon the means of forming a dry scale. Two drachms of the bromide of iron were dissolved in two fluid ounces of water, and the patient had twenty drops three times a day. The treatment was commenced on the 22d day of February 1841. The external treatment by bromine was soon suspended. The dose of the internal remedy was gradually increased to 100 drops three times a day. This large dose on the 22d of March had produced no unpleasant symptom, but great improvement of the appetite and increase of strength appeared to have resulted from its use. The rupia got well under the application of nitrate of silver.

Case XVIII.—Chronic rheumatism in a man aged 24. Here the internal use of the bromide of iron in the dose of six grains thrice a day gave rise to severe pain of the head and chest. (Newcastle Infirmary.)

Remarks.—The cases whose prominent features I have thus endeavoured to describe can be only supposed to give the slightest possible foundation on which to frame inductions with regard to the real therapeutic power of bromine and its compounds. I should be induced to recommend the external use of bromine in scaly dartrous affections of a peculiarly inveterate character, in specific and malignant ulcers where there is defective action, and in the form of lotion the element furnishes an elegant and cleanly application. The solution is slowly changed by the action of light; the hydrobromic acid being formed. Oil skin should be employed to cover the lint in which the bromine is dipped, in order to prevent the evaporation.

Internally the use of bromine must necessarily be very limited. The sensation which attends the swallowing of it is, I repeat, truly horrid. The bromide of potassium is less powerful than the iodide, and might perhaps be used with advantage where the latter is apt to disagree with the stomach. The bromide of iron is perhaps the most agreeable of the strong preparations of iron. I have prescribed it frequently as a general tonic, and in hysteria and leucorrhœa. I conceive it to be less liable to decomposition than the iodide. A most exaggerated notion has been entertained of its power. The bromide and sub-bromide of mercury appear to have the good and bad properties of corrosive sublimate and calomel.

PART III.—GENERAL CONCLUSIONS.

1. Bromine appears to resemble chlorine much more than iodine in its physiological properties.
2. All the bromides seem to bear a closer relation to the chlorides physiologically than to the iodides.
3. The chemical and physiological relations of the group of halogenous elements and their compounds are in strict accordance.
4. Although in general the compounds of chlorine, bromine, and iodine with metals appear to resemble other salts of the same bases, in their action on the animal economy, yet we may perceive that the haloid salts are for the most part marked by peculiar resemblances.
5. As far as we can observe, the class of medicinal agents which bromine and its compounds furnish, is intermediate in medicinal action between the two allied groups, but nearer that of chlorine than that of iodine.

CORRIGENDA.

In note, p. 132, *for* soluble in a large quantity *read* "soluble in a large quantity of water."

P. 183, 16th line from top, *for* recent symptoms *read* "seconds: symptoms."
138, 22d ——— *for* observation *read* "operation."
139, 22d ——— *for* an *read* "and;" *for* was *read* "were."
141, 18th ——— *for* refuted *read* "suspected."
—— 2d ——— *for* 19th *read* "18th."
—— 5th ——— *for* 20th *read* "19th."

ART. VI.—*Pathological and Histological Researches on Inflammation of the Nervous Centres.* By JOHN HUGHES BENNETT, M. D., Edinburgh, Lecturer on Clinical Medicine and on Histology, &c. &c.

ON entering upon a field so new and unexplored as that of the morbid structural changes in organs discoverable by means of the microscope, it seems necessary for the inquirer to separate as much as possible the facts or actual appearances observed, from the suppositions and theoretical conclusions to which these may give rise. It has further appeared to me essential that the histological examination of diseased organs should be studied in relation with the symptoms and usual *post mortem* appearances observed; for if such inquiries are ever to be useful in a practical point of view, they can only be rendered so by connecting them with clinical observations. I have been guided by these views in investigating the subject of inflammation of the nervous centres, and have thus been enabled to arrive at results which appear to me sufficiently novel and important to justify their publication.

For the last twelvemonths I have neglected no opportunity which presented itself to me of examining microscopically the human brain and spinal cord. My observations have extended to 54 such cases, which for the most part were examined after death in the Royal Infirmary of Edinburgh. They are detailed at length in the hospital books, and in a more condensed form in the book of dissections kept by Dr Peacock, the prosector to the institution. I have myself observed the symptoms in many of these cases when living; have been present at the *post mortem* examination of all with the exception of five, and have examined with the microscope the cerebral structure in every instance.*

In many cases where death had been occasioned by chest or abdominal affections, no functional or organic lesions of the nervous centres could be discovered. In others, where death evidently depended upon disease of the brain or spinal cord, abnormal appearances could readily be observed, such as increased vascularity, effusion of lymph, hemorrhage, softening, tumours, &c. The structure of the nervous textures thus altered by disease was carefully examined with the microscope, and the results noted at the time. In other cases, again, where there had been violent head symptoms, and yet where nothing could be detected by ordinary vision, I was often enabled to show, by means of the microscope, decided structural alterations similar to those seen in more evident lesions. I shall therefore divide the cases to be detailed into two principal groups, in which were observed, 1. Well known lesions of the nervous centres, appreciable to ordinary sight; and 2. Lesions imperceptible to ordinary sight, detectable only by means of the microscope. In cases belonging to the first group it has occasionally happened that, in other portions of the nervous centres, microscopic evidence alone of disease has existed; but these will be pointed out and commented on in the remarks appended to each observation.

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* I must here express my obligations to the different physicians and surgeons of the Royal Infirmary, who have permitted me to publish the details connected with their respective cases. My thanks are especially due to Dr Peacock, prosector to the institution, for the readiness and obliging manner with which he has at all times placed portions of structure at my command, and furnished me with information respecting the different cases. The cultivators of scientific medicine have every reason to feel gratified when such situations are filled by gentlemen who, themselves ardent investigators of disease, are yet willing to allow others all the advantages which their position furnishes.

I.—OBSERVATIONS CONNECTED WITH WELL KNOWN LESIONS OF THE NERVOUS CENTRES, APPRECIABLE TO ORDINARY SIGHT.

OBS. I.—*Typhus Fever, Delirium, sudden Hemiplegia and loss of speech; contraction of the right arm, death in fifteen days, portion of the left hemiplegia involving the corpus striatum softened; nervous tubuli broken up; numerous exudation corpuscles and granules.*

Robert Fairgreave, aged 40, a labourer, much addicted to drink, was admitted into the Royal Infirmary, August 6th 1841, under Dr Alison. A week before admission he was seized with rigors, headach, sickness, loss of appetite, thirst, and hot skin. These symptoms, with the exception of rigors, still continued when he entered the house; the urine also was scanty and high-coloured. The pulse was 80, full and compressible, bowels regular. On the 8th, the pupils were contracted, and there was a considerable eruption on the skin. During the night of the 9th, there was some delirium; on the 11th, there was stupor and coldness of the extremities; pulse 108, feeble. (Wine and spirits.) On the 12th, pulse was still 108, but of good strength; pupils still contracted. There has been twitching of the mouth, which has now subsided. From this time he went on apparently improving until the 18th, when he was seized with hiccup; the surface became cold, and he fell into a state of insensibility; the mouth was drawn to one side; the right arm was paralyzed; urine passed in bed; pulse 98, of good strength. 19th, Continued speechless; still paralysis of the right arm, and distortion of the face; surface warm; stools passed in bed; pulse 92, of good strength. 20th, Hemiplegia of right side is complete; returning consciousness. 21st, Takes food, but does not speak; eruption has disappeared; skin becoming cold; some contraction of the right arm. 22d, Skin cold; respiration somewhat laboured. 24th, Less contraction of the arm; countenance more intelligent; tries to put out his tongue when asked. 28th, Still speechless; contraction of the arm has ceased; appears drowsy. 30th, Insensibility more profound. September 1st, Stools passed in bed; rigors this morning. 2d, Takes no food; rigidity of extremities. Died September 3d.

Sectio, September 4th.—On opening the cranium the membranes presented nothing abnormal. About the middle of the left hemispheres a circumscribed portion of the cerebral substance below the membranes appeared of a reddish hue. On cutting through this portion into the substance of the hemisphere, the medullary substance, together with the external portion of the left *corpus striatum*, was found softened to about the extent of a small hen's egg. The softening gradually extended towards the reddish portion on the surface previously noticed. The centre of the softened part, about the size of an almond, was of pultaceous consistence, and from this centre the cerebral substance grew more and more firm, until it attained its normal character. This centre also was of a dirty yellow, and the softened part surrounding it of a bright rose colour. ℥ss. of serum was collected from the ventricles by means of a pipette. Walls of the ventricles and other portions of brain healthy; other organs in a normal state.

Microscopic Examination.—The medullary matter towards the circumference of the softened portion was first examined. The varicose and cylindrical tubes of the brain were readily separated from each other and broken down; mixed with them and their debris were numerous granular bodies, considerably varying in shape and size. Some were perfectly round, others oval, and others again of irregular form, having one or more sides, and irregular indentations. In size they varied from $\frac{1}{100}$ to $\frac{1}{25}$ of a millimetre in diameter. Some of these bodies possessed an envelope in which the granules were enclosed, in others no envelope could be observed. In the former the edge of the corpuscle was abrupt, regular, and well-defined; in the latter ragged, irregular, and confused. They were generally of a brownish colour, some light, but others so dark as to appear almost black, and so opaque as to obstruct the passage of light. I could not in this instance detect any distinct nucleus in these bodies. There were also a number of granules floating loose amongst the tubes, similar to those contained in the corpuscles just described. These varied in size from $\frac{1}{500}$ to $\frac{1}{250}$ of a millimetre in diameter. When viewed thus isolated they appeared perfectly round and transparent, presenting a bright white central spot, with a black, abrupt, and well-defined edge. See Plate V. Fig. 1.

On examining a portion of the softened substance still nearer the centre, the same appearances were observed. The loose floating granules, however, appeared more numerous. In the yellow pultaceous centre itself the nervous tubes appeared utterly destroyed. Nothing could be seen of them but short fragments, and round and oval globules bounded by a distinct double line. They were highly elastic, and appeared to be separated varicose swellings of the tubes. The granular corpuscles described had lost their regular shape. They were much smaller, apparently broken down, and scattered widely in the field of the microscope. The granules, on the other hand, were more numerous. Fig. 2.

On examining a portion of the brain which looked healthy, immediately at the edge of the softened portion, a few of the corpuscles still appeared, but they diminished in number, and were entirely absent half-an inch from the softened portion.* Fig. 3.

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* The microscope generally employed was a very excellent achromatic instrument, constructed under my own eye by Vincent Chevalier of Paris. Occasionally, how-

Remarks.—In this case the continued cephalalgia and contraction of the pupils at an early stage indicated strong congestion of the brain. The stupor which succeeded, the sudden loss of consciousness, paralysis of the right arm, and distortion of the face, followed by complete hemiplegia; then contraction of the right arm, return of consciousness, but continued loss of speech; and then relapse into a state of insensibility and rigidity of the extremities before death, constitute a group of symptoms highly characteristic of acute inflammatory softening. The softened cerebral substance after death, existing in the hemisphere opposite to the paralyzed side, the yellow pultaceous centre and surrounding pinkish inflammatory margin, could leave little doubt that it was the cause of the previous symptoms. The lesion, from being so well-marked and unequivocal an example of softening dependent on inflammation, offered the best opportunity for examining its histological elements. Here, it is worthy of remark, that the yellow centre, which all who examined it conceived to be purulent matter, presented none of the well-known structural appearances peculiar to that fluid.

The dark granular corpuscles described have been named compound inflammatory or aggregation globules (Gluge.) Exudation globules (Henle, Vogel, Gerber.) According to my observations these bodies are of two kinds—some being merely composed of numerous granules aggregated together, whilst others are enclosed in a distinct envelope. In future I shall denominate the former *exudation masses*, and the latter *exudation corpuscles*. The granules will be termed *exudation granules*. A more complete description of each, with their mode of formation, and the changes they undergo, will be given in a future part of this paper. In the meantime, these terms will prevent the necessity of repeating the descriptions of each in the subsequent observations.

Obs. II.—*Hypertrophy of the heart with mitral disease; hemiplegia of the left side; loss of consciousness; return of intelligence; and partial diminution of paralysis; death six months after; softening of the right corpus striatum, and the cerebral substance surrounding it; nervous tubes broken up, mixed with exudation masses and corpuscles; vessels of the diseased part coated externally with exudation granules.*

Ellen Bayne, aged 25, admitted into the Royal Infirmary,

ever, I employed instruments manufactured by Oberheuiser and Brunner of Paris. The mode of examination consisted in simply placing minute portions of different parts of the cerebral structure between slips of glass, and pressing them so as to render the whole capable of being examined by transmitted light. The magnifying power usually employed was 300 linear diameters, which I have always found sufficient for such investigations, although I have often magnified the object 3000 linear diameters. At different times during the past year similar appearances to those described have been shown by me to several of the physicians of the infirmary, and of this city, and to the pupils attending my classes.

June 8th 1841, under Dr Craigie: married. Six months ago she was attacked with pain in the heart and giddiness, followed by want of power in the whole of the left side of the body, and loss of speech. On the following day she became insensible, and remained so nearly a fortnight; at all events more than a week. She entered the hospital in Aberdeen, was bled and underwent other treatment, and has gradually improved until now. The symptoms on admission were, weakness in the left side and left extremity, with inability to place the left foot firmly on the ground. She has recovered the power of the left side of the face, and has considerable command over the left upper extremity; loss of appetite. (Bleeding, purgatives, and blister to the head.) She remained in this state until July 8th, when she complained of pain in the region of the heart. A sonorous rattle was heard in the chest; respiration not very audible; impulse of the heart was strong, and a rough rolling murmur with the first sound. (Bleeding to ℥xiv.; blister to cardiac region.) 14th. Cardiac action less violent; has little power over index-finger of left hand. On July 20th, she went out of the Infirmary by her own desire, but was brought back on the 25th, with the following symptoms: Surface of the body and extremities cold; pulse gone at both wrists; respiration laborious; sensible, recognized surrounding persons; voice feeble; difficulty in speaking; lips livid; general prostration. (Stimulants, blisters, turpentine enema.) Died 10 P.M. It is stated that she has had frequent miscarriages; that on leaving the house she slept on a cold floor, and caught cold; had constipation and fever, which increased with difficulty of breathing until her readmission.

Sectio, July 27th.—The subarachnoid cellular tissue was infiltrated with serous fluid, and the vessels of the *pia mater* much loaded with dark-coloured blood. On making sections into the hemispheres, much serum escaped. The ventricles were somewhat enlarged; ℥ss. of serum was taken from the right ventricle, and ʒij. from the left one. The whole surface of the right *corpus striatum* was of a fawn colour, had lost its rounded convex appearance, and though smooth, was soft and pulpy in consistence. External to the right *corpus striatum*, the medullary matter was softened, and its texture broken up into a pulp. The colour of this softened portion was of a yellowish-red, its size about that of a hen's egg, and it grew more dense in consistence towards the periphery. The right Sylvian artery opaque, firm, friable, and contracted. Rest of the brain normal.

The heart was enlarged in all its dimensions, weighed ℥xiij. The right ventricle was enlarged half as much again as its usual size, and its parietes were thicker and firmer than natural. There were cartilaginous and bony depositions in the mitral valve, encroaching considerably on the left auriculo-ventricular opening, The little finger could scarcely be introduced into it.

Microscopic Examination.—The varicose and medullary tubes throughout the whole of the softened portion readily broken down; more so towards the central pultaceous part. Numerous exudation corpuscles, granules, and masses scattered through the diseased structure. The latter varied much in shape, some being triangular, some having different sides, some more round, and others oval. Their size varied greatly. Some were formed of a congeries of two, three, or more granules, whilst others were composed of a hundred of these. Many of the intermediary and larger blood-vessels were coated externally with a thick layer of these granules. This layer was sometimes two or three times thicker than the vessel in connection with it, and was in many places cracked or split up, forming similar masses to those floating loose. The granules composing these masses were readily separable from blood-globules by their minute size, and by the absence of any central nucleus. The blood-globules might frequently be seen unchanged within the same vessels which were coated externally by the granules. Fig. 4.

Remarks.—The progress of the symptoms was more gradual in this case than in the last. If the statements of the patient were to be relied on, the cerebral affection commenced like certain forms of apoplexy. This is by no means uncommon in cases of softening, and I have myself seen this occur so frequently, that I some time ago described this change as one of the anatomical lesions producing that disease.* The phenomena connected with the first and last attacks were imperfectly observed, as she was at the time under no medical care. The absence, therefore, of contraction, mental confusion, and other symptoms in the report, are not to be considered as proofs of their non-existence. The dissection exhibited an anatomical lesion, referable to inflammation, although, instead of thé bright rose-colour observed in the last case, it was of a brownish or yellowish tinge. Here it must be remembered, that in the first case the softening was only of fifteen days standing, whereas in the present one the morbid alteration had probably existed six months. A microscopic examination, however, showed it to be composed of the same histological elements, only that, instead of exudation corpuscles, exudation masses were more numerous. From the disposition of such masses as were connected with the vessels, together with the numerous granules coating them externally, the origin of these appearances was clearly indicated. It at once became evident that a portion of the fluid part of the blood had transuded through the vascular walls, and coagulated in the form of granules external to them.

OBS. III.—*Sudden loss of consciousness; hemiplegia of the right side; thickness of speech and obtuseness of intellect; death thirteen months and a-half after the attack; left corpus striatum and surrounding cerebral substance softened; hypertrophy of the heart, with disease of the mitral and aortic valves; Bright's disease of the kidneys; exudation corpuscles in the softened portion.*

Patrick Mackearnan, aged 33, admitted into the Royal Infirmary under Dr Craigie, June 15th 1841; by occupation a sawyer. About twelve days before admission, while engaged in sawing wood, he fell and struck his back against a block of timber. Much pain and difficulty of breathing were occasioned, to relieve which symptoms he took a considerable quantity of whisky. On the 12th of June, nine days after meeting with the above accident, he suddenly fell down insensible while at work, without having complained of headach previously, and on being assisted to rise, it was found that he had lost the power of speech, and that of motion over the right arm and leg. (Bled, purgatives, head shaved, and cold applied.)

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* Library of Practical Medicine, Art. Apoplexy, Vol. ii. p. 89.

On admission there was complete resolution of the right extremities, all sensibility and motor power in them being lost. His speech was thick, and he answered questions incoherently. The tongue, when protruded, was turned to the right side, and the apex was depressed. The pulse was 66, strong and full; the countenance much flushed, and the pupils somewhat contracted. He slept almost continually, but had no delirium. The cardiac beats more slow and distinct, and the last sound prolonged, and attended with a bellows murmur. 16th. There was no pain in the head, but some vertigo; other symptoms the same. (Large bleeding and purgatives.) 23d. The urine passed amounts to one pint in quantity, deposits a white sediment, and is of an ammoniacal odour. 25th. The paralysis unchanged; answers questions stupidly, and comprehends with difficulty. July 7th. No change, although he communicates more clearly that the right side has lost all sensibility. 15th. More intelligent; a slight return of command over the right leg. 26th. He answers questions in monosyllables, but seems to understand them better than formerly. Paralysis the same as at last report. The left angle of the mouth still drawn towards the ear. Complains of pain in the right arm, and an uneasy feeling over the whole of the right side when the limbs are moved or touched. (Strychnine internally.) August 4th. The whole of the skin of the right side of the head, right arm, chest and side, covered with a profuse perspiration, while, with the exception of the left side of the face, the left side is dry and natural. 13th. He complained of symptoms of pyrexia, and erysipelas now became developed, which first covered the left, and subsequently the right side of the head. He had completely recovered from this on the 31st, when he was found to have regained considerable command over the right leg, but none over the right arm. The mouth was still drawn on one side, and he continued to speak in monosyllables.

From September till June 1842, he had so far recovered as to be able to walk about the ward with the assistance of a stick. He was then seized with a fresh attack of erysipelas, during which he rambled more, and complained of pain in the head, in the right side, and in the leg, his arm during the whole of this time continued entirely powerless. From this time he remained in bed, gradually declining in strength. His mind was throughout stupid and peevish; a fortnight before his death, the legs became œdematous; died suddenly on the 1st of August 1842.

Sectio, August 2d. The *dura mater,* more especially in the course of the longitudinal sinus, was opaque and thickened. A small mass of lymph, of a yellow colour and size of a sixpence, was found on the upper surface of the right posterior lobe, near the longitudinal fissure. Both ventricles were dilated; ʒiij. of fluid of a pale colour was removed from the right, and ℥j. from the left ventricle, which was fully three times the size of the opposite one, the septum being completely pushed over to the right side. This dilatation occupied chiefly its posterior and inferior cornua. The central portion of the left *corpus striatum* presented a patch about the size of a shilling, of a hard texture and dirty yellow colour, rough and irregular on the surface. On making an oblique section through this from within outwards, it was found to constitute the internal boundary of a softened space, about the size of a walnut, which extended to the external and lateral surface of the hemisphere, above the course of the *fissura Sylvii*. The convolutions which constituted the external boundary of this softened space were of pultaceous consistence, and the arachnoid covering them as well as the *pia mater*, were much thickened. The softening itself was so diffluent, that, after making the section, a cavity was left. Immediately surrounding this, the medullary texture was of a fawn colour and soft, gradually disappearing till it terminated in healthy brain.

The heart weighed 21 ounces, and was of unusually large size; the left ventricle was greatly hypertrophied and dilated; the mitral aperture was studded with warty growths, and the large fold of the valve was opaque and thick, having attached to it several large firm masses fully three-quarters of an inch in length. The aortic aperture was closed only by two valves; these were covered with irregular vegetations of irregular shapes; the right ventricle and auricle considerably dilated; a considerable aperture existed between them, admitting of considerable regurgitation; the aorta was considerably dilated throughout the whole of its thoracic portion; both kidneys were in the second stage of granular degeneration.

Microscopic Examination.—I was not present at the *post mortem* examination, and only examined on the subsequent day a portion of the softened cerebral substance kept for me by Dr Peacock. This contained numerous exudation corpuscles and granules, the latter coating the vessels in great numbers. Near the central cavity no trace of nervous tubes could be seen, the whole being broken down into a grumous granular mass, in which fragments of nervous tubes, exudation corpuscles, and their envelopes could be detected, with occasional fat and blood globules, Fig. 10.

Remarks.—The mental faculties are frequently affected in cases of softening, and that in a peculiar manner. The memory is weak and more or less abolished; the patients do not readily comprehend questions, and their replies are not to the point; the countenance has a stupid expression, and the speech is more or less thick, slow, and embarrassed. Such appears to have been the state of this man for many months, combined with hemiplegia. No contraction or rigidity of the paralyzed parts, however, was at any time observed. It should be remarked, however, that he laboured under the disease three days before admission, during which time the symptoms were not well observed. I think it will be found that contraction and rigidity are symptoms of very acute softening at the commencement, or of irritation supervening upon chronic disease. In the present instance, the progress of the affection was slow. The primary suddenness of the attack, combined with the *post mortem* appearances, also gives rise to the suspicion, that it must have been accompanied with hemorrhage. May not the central cavity, and the hardness in some of the portions which bounded it, have been owing to the original presence of a coagulum, and to subsequent efforts made by nature to remove it? The usual colour generally found in old apoplectic cysts was wanting, but then the symptoms indicate that softening was connected with the coagulum from the commencement, which might have produced the unusual appearances. It is at least evident from this case, that the exudation corpuscles and masses which have been described not only exist in acute softening, but may be present in very chronic cases.

Obs. IV.*—*Cephalalgia; feebleness of intellect; hemiplegia; convulsions; complete resolution of the limbs; death ten days after attack of hemiplegia; left corpus striatum softened; right corpus striatum and portion of medullary substance softened; numerous exudation corpuscles presenting a nucleated character in softened substance of right hemisphere.*

Alexander Davidson, a mason, aged 56, of rather intemperate habits. Four years ago he had a severe fall, which was followed by a degree of paralysis of the face for some time afterwards. Otherwise he has ordinarily enjoyed good health, with the exception of occasional attacks of headach and giddiness. For the last three months he has given evidence of weakness of the mental faculties. On the 16th of January 1842, he was in good health. When getting up, however, on the morning of the 17th, his wife first observed that he could not without difficulty raise his left arm, and that in walking he dragged his left leg a little. When first seen on the 20th, his countenance was flushed, and had a stupid expression; the left corner of the mouth was sunk down; the left eyelid inclined to droop; pupils natural; conjunctivæ smeared with mucus; pulse 90, feeble. In walking, the left leg was dragged; the left arm lifted with difficulty; sensibility of the affected side unimpaired; no rigidity of the limbs; tongue well protruded. (Purgatives; blister to back of neck.) On the 22d, the pulse was 100 and firm; the left eyelid more drooping; deglutition difficult; restless night, with jactitation of limbs. (Bled from a large orifice to ℥xij., when syncope appeared. More blood escaped from the opening during the night; blood slightly buffed; crassamentum firm.) 23d. Convulsions confined to the left side; no control over the bladder; deglutition more difficult; ptosis of left eyelid. (Head shaved; cold applications.) 24th. Complete resolution of the limbs; generally drowsy, but sometimes appears sensible. He became more and more comatose, and died on the 27th.

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* Dr Ransford invited me to be present at the examination of this case, and to him I am indebted for the details regarding it.

Sectio, 25 hours after death. A considerable quantity of blood escaped on sawing through the occipital portion of the cranium. Membranes rather more vascular than usual, with some patches of osseous deposit on the *dura mater* in the course of the longitudinal sinus. Subarachnoid serous effusion, more especially over the right hemisphere, which was broader than the left one. No fluid in the ventricles. The right *corpus striatum* was softened, in some portions much more so than in others, presenting somewhat of a cribiform appearance. The medullary matter external to it also softened to the extent of a hen's egg. It was of a reddish colour, and of a pultaceous consistence in the centre; optic thalamus was healthy; the left *corpus striatum* also softened in consistence, but unchanged in colour; the softening was circumscribed to the *corpus striatum;* the surrounding parts and other portions of the brain healthy.

Microscopic Examination.—The softening on the right side contained numerous exudation corpuscles, both floating loose and attached external to the vessels. In the central pultaceous portion the varicose and cylindrical tubes were much broken down, and numerous corpuscles and granules were floating among them. These corpuscles had distinct cellular walls, and contained a colourless, transparent, circular body, resembling the nuclei found in nucleated cells. Sometimes one cell contained two of these apparent nuclei. They varied much in size, constituting from $\frac{1}{6}$th to $\frac{2}{3}$ds of the whole corpuscle. The granules in these were situated between the nucleus and cell wall. In a few instances, two or three granules could be seen within such nuclei as were of large size, (nucleoli?) In some cells no apparent nuclei could be seen, and they were more or less full of granules like those previously described. Similar nucleated and non-nucleated corpuscles were aggregated together, with numerous granules between the vascular net-works. Figs. 6 and 7. The *corpus striatum* on the left side contained no exudation corpuscles or granules.

Remarks.—The mental faculties were for some time in a similar state to what we observed in the last case, when paralysis of the left side suddenly appeared, followed by convulsions, coma, and death. The membranes were observed to be more vascular than usual, there also existed subarachnoid effusion. Should we ascribe to these changes in the meninges, the mental weakness, or the convulsions which preceded death? Considering their recent character they presented, the latter opinion seems most probable. Lallemand always ascribed convulsions, in such cases, to inflammation of the arachnoid; and it is further confirmatory of this view that the subarachnoid effusion was on the right side, and convulsions on the left.

Whilst the left side of the body only was paralyzed, softening was found on both sides of the brain. In the right hemisphere, however, the softening was more extensive than on the left, and from its red colour, appeared more acute and recent. The softening on the left side was scarcely to be distinguished from the natural colour of the *corpus striatum*. It is important to observe, in conjunction with the symptoms which have been described, as affecting the left side of the body, that the exudation corpuscles and granules were only found to exist in the right hemisphere. This curious fact will be dwelt on more at length subsequently, as also what may possibly be the nature of the softening in the left *corpus striatum*. The peculiar nucleated character of the corpuscles is also worthy of remark.

Obs. V.—*Apoplexy; complete loss of consciousness; perfect hemiplegia of the right side; great rigidity of the muscles on the left side; death in six hours; hemorrhage into the left hemisphere of the brain; an old apoplectic cyst, and small cavities containing softened cerebral substance in the right hemisphere; numerous exudation corpuscles and granules in the softened tissue of right hemisphere.*

Alexander M'Ostridge, aged 40, admitted into the Royal Infirmary, October 15th 1841, under Dr Spittal; a blacksmith. Twelve months ago he had an apoplectic seizure, for which he was profusely bled, and recovered in a few days with slight paralysis of the left side. This gradually disappeared, and he continued in tolerably good health until six weeks ago, when he is said to have frequently complained of headach. This morning he arose in good health, and after eating a hearty breakfast, went to work as usual. While engaged in his usual occupation, he fell down suddenly at half-past ten A. M. in a state of complete insensibility. He was brought into the infirmary an hour afterwards.

On admission there was total loss of consciousness. The respiration was laborious and stertorous, accompanied with a frothy excretion from the mouth, which was blown from the lips with considerable force; pulse exceedingly full and strong, and about 110 in the minute; face pale and stern, in a state of perspiration; power of deglutition lost; left arm and leg rigidly extended, and could not be flexed without using considerable force; right extremities flaccid, in a state of complete resolution; eyes glassy, the right pupil much contracted and totally insensible to light, but the left was rather less so, and contracted slightly when the flame of a candle was placed close to it. Bled from the arm and temporal artery to ℥xxx.; large dose of croton oil internally. Breathing became less stertorous and laborious after the bleeding, although this symptom returned in paroxysms at intervals of ten minutes; pulse less full and strong, but rather quicker. A cold clammy perspiration broke out over the body, more especially about the face and forehead. He continued in this state till half-past four P. M., when he died.

Sectio, October 17th. The convolutions of the brain presented a remarkably dry and flattened appearance. On slicing the left hemisphere, a large coagulum was found in its substance extending from the anterior to the posterior lobe, and to within a short distance of the base of the brain, but did not communicate with the ventricle. The cerebral substance in immediate contact with the clot was soft and broken up. On slicing the right hemisphere a number of small cavities were found in the anterior lobe, lying close together, and lined by a loose flocculent membrane. Near to these was one the size of an almond, filled with a soft membranous or minute vascular tissue, of a pink or salmon colour. On cutting deeper into the hemisphere, an old apoplectic cyst, half-an-inch long, was discovered running parallel to the *corpus striatum*, and a quarter of an inch external to the ventricle; it contained no coagulum. Its walls were collapsed, of a dirty yellow colour, which extended a little distance into the surrounding medullary tissue. The substance of the cerebrum was harder than usual. The main trunk of the cerebral artery contained in its walls small nodosities of bone, and the basilar arteries and its branches were in a similar state.

The heart was much enlarged, weighed 21 ounces. A considerable quantity of serum in the pericardium. On cutting into the left ventricle its parietes were found much thickened and very firm. The cavity and *columnæ carneæ* larger than usual; the mitral valve a little thickened.

Microscopic Examination.—The cerebral tissue immediately surrounding the hemorrhagic effusion on the left side presented nothing abnormal. The walls of the old apoplectic cyst on the right side also presented under the microscope the normal appearance of brain. The pinkish softened matter within the small cavities, on the right side, presented numerous exudation corpuscles and granules, mingled with broken down varicose and cylindrical nervous tubes. The vessels ramifying in this substance were densely coated with exudation granules, several masses of which were seen breaking off. These granules were so crowded together in some places, and more especially between the interstices of the intermediary vessels, as to render the field almost opaque, and give it a black smutty appearance, in which no trace of organized structure could be discovered.

Remarks.—The progress of this case was exceedingly rapid, and it is one of great value, on account of the accurate details obtained respecting it. The man had an apoplectic seizure twelve months before admission, from which he recovered with slight paralysis of the left side. An old apoplectic cyst was discovered in the right hemisphere, with its walls collapsed, and of a rusty colour. There can be no doubt, both from its situation and appearance, that this was the remains of the hemorrhage which caused the first attack. It is stated that, six weeks previous to the last and fatal attack, he had frequently complained of headach, indicating a strong tendency to congestion of the cerebral vessels. The symptoms of this latter attack were peculiar, presenting complete paralysis and resolution of the right side, combined with great irritation and muscular rigidity of the left. These symptoms naturally indicated that the two central hemispheres were differently affected, and pointed out the probable existence of hemorrhage on the left side, and inflammation or acute softening on the right. Now, whilst the dissection exhibited extensive hemorrhage into the left hemisphere, it left the existence of inflammation on the right side very doubtful. The walls of the old apoplectic cyst exhibited no appearance of acute action. The small cavities filled with the pinkish substance might have been by some considered the remains of small hemorrhagic effusions, and by others to be chronic softening advancing to a cure. There can be no doubt that they constitute the appearance described by Dr Sims, (Medico-Chirurgical Transactions, Vol. ix.) On examining them with the naked eye, no one could affirm that they bore any relation to acute softening, nor could inflammation be detected on that side of the brain. How, then, were the violent symptoms of irritation existing on the left side of the body to be accounted for? Attributing them to congestion or recent inflammation in the cerebral substance surrounding the old apoplectic cyst was evidently incorrect. The intervening substance of the brain was a little indurated, but every where healthy. The cause of the rigidity on the left side of the body, therefore, remained unexplained. Now it is important to remark, that the microscopic examination detected in the softened cellular substance, a very abundant formation of the same exudation corpuscles and granules, as I have previously described as existing in parts undoubtedly affected with acute inflammation. None of these were present in the central substance surrounding the clot on the left side, or the old apoplectic cyst on the right. It may now be asked if the presence of these bodies are alone a sufficient proof of inflammation, and capable of explaining the violent symptoms which have been described. I do not consider this observation in itself sufficient to produce conviction of this in the mind of the reader. Before proceeding, however, to detail other facts, I must request him to bear in remembrance the history of, and remarks on the last observation, No. III.

Obs. VI.—*Deafness and amaurosis on the left side; partial paralysis of the left side of the face; feebleness of intellect and gradual imbecility; sudden loss of consciousness and rigidity of the right extremities; death eight months from commencement of the symptoms; tumours in the pons varolii; atrophy of the left optic nerve; no apparent softening in the left hemisphere; numerous exudation corpuscles and granules in the left optic thalamus and corpus striatum.*

Abraham Dick, aged 33, a soldier. He states that when in Ceylon he fell asleep exposed to the sun, and has been deaf ever since. Four months previous to admission the deafness increased, and he experienced pain in the left eye, extending to the temple. On admission there was total loss of hearing on the left side, amaurosis of the left eye, with some degree of strabismus outwards, and dilatation of the pupil. The left eyelid drooped somewhat, and there was loss of power and hanging down of that side of the mouth. He complained of shooting pains a little below the left eyelid, and some tenderness on pressure there. The intellectual faculties seemed obtuse. General feebleness of the limbs on both sides, but without paralysis. He could walk unassisted, and stand erect without difficulty. Pulse 57; bowels torpid. (Purgatives; abstraction of blood from behind the neck by cupping.) For a month he continued very nearly in the same state, during which period a seton was inserted in the neck, he was put under the influence of mercury, and was latterly ordered the hydriodate of potass and iodine. August 4th, The intellectual faculties more impaired. He answered questions without meaning, and he was scarcely intelligible. The ptosis and dilatation of the pupil diminished. He saw the hand placed between the eye and the light. October 8th, The intellectual powers have been gradually getting more feeble. He talks a good deal, but in no very intelligible manner. 10th. This morning there was sudden loss of consciousness, rigid extension of the right leg, and powerful contraction of the right arm, the right cheek flaccid and hanging down. 16th. Consciousness has partially returned; appears to recognize persons, but generally lies in a drowsy state. There has been perfect paralysis and resolution of the right arm for three days. 18th. Rigidity of the right arm has returned; he moves both lower extremities and the left arm. 20th. The right leg powerfully contracted towards the thigh, and the thigh towards the abdomen. When this extremity is forcibly extended, he appears to suffer pain, and on removing the extending force, it is again retracted. Still possesses some slight degree of consciousness. 21st. Pulse above 100, small and weak; both pupils dilated. In the evening he gave a feeble exclamation, moved the right leg spasmodically, and expired.

Sectio, 44 *hours after death*.—The cranium was somewhat thinner than usual; serum effused under the arachnoid; considerable venous congestion; bloody points on slicing the brain; the ventricles contained a small quantity of turbid fluid; the left optic nerve was much atrophied, and adherent to the pituitary body, and to the membranes surrounding the optic foramen. Towards the base of the brain, a little posterior to the clinoid processes, the medullary substance was softened to about the size of a nutmeg. The softened portion was of a straw-yellow colour, pultaceous consistence, and gelatinous appearance. The surrounding cerebral substance was healthy, without any vascularity or discoloration. A hard tubercle, about the size of a large hazelnut, was found imbedded in the *pons varolii*. It was irregular on the surface, presenting two prominences, the smaller of these a little to the right of the mesial line, the larger immediately above where the left *crus cerebri* came off. The root of the third nerve was hard and tumid, and more expanded than that of the right, which was healthy. The sixth and seventh nerves healthy. The internal ear was broken open, but nothing abnormal could be discovered. The other organs healthy.

Microscopic Examination.—As the structure of the tumour is in no way connected with the present series of observations, I consider it unnecessary to describe it in this place. Throughout the substance of the optic thalamus and *corpus striatum* on the left side, numerous exudation corpuscles, masses, and granules were found. The two latter also were attached in great abundance to some of the vessels, (Fig. 5.) The straw-coloured softening in the medullary substance contained none of these bodies. The tubes, however, were readily separated from each other but not broken down.

Remarks.—The existence of a tumour at the base of the cranium was accurately diagnosed by Dr Henderson long before death. It would be foreign to the object of this memoir to enter into the analysis of the amaurosis, strabismus, ptosis, and other symptoms connected with this lesion. The peculiar state of the mental faculties, however, present in this case, has been previously noticed in connection with softening. In addition to this symptom, it is stated that the limbs were generally feeble. It is probable that this depended in some measure on the want of mental power. Ten days before death, there was sudden loss of consciousness, and powerful rigidity of the right extremities. The latter symptom disappeared in three days, leaving perfect paralysis of the right arm, but four days subsequently again returned. The intelligence, though very obtuse, was not absolutely lost. If these peculiar symptoms be compared with those detailed in Observation I. they will be found almost identical. In that instance, the *corpus striatum* and cerebral substance opposite the side affected, had undergone acute inflammatory softening. In the present case, however, there was no evident acute softening in the left hemisphere. I well remember that during the dissection the attention both of Dr Henderson (physician of the ward), and Dr Peacock (the prosector,) were attracted to the left *corpus striatum*, and yet in the different reports given by these gentlemen of the *post mortem* examination, no lesion whatever of this part of the brain is noticed. This is an important fact, inasmuch as it proves that persons well accustomed to morbid appearances could detect nothing abnormal in the *corpus striatum*, even after a strict and particular scrutiny of that body. An examination with the microscope, however, demonstrated both in the left *corpus striatum* and optic thalamus, numerous exudation corpuscles, and the same appearances as have been previously described, exist in undoubted acute softening.*

In this case, also, a straw-coloured gelatinous softening occurred in the medullary substance of the left hemisphere at the base of the brain. It contained no exudation corpuscles or granules, and none of the ordinary appearances of purulent matter. It may be asked what was the nature of this kind of softening? In a previous observation (Observation III.) we met with a softening in the left *corpus striatum*, apparently producing no symptoms, and containing none of the peculiar corpuscles found on the opposite side of the brain. Such also was the case in the present instance. In this kind of softening unattended with any formation of exudation corpuscles, the nervous tubes of the brain are demonstrated with the greatest facility, readily separating from one another, and extending unbroken for a considerable length.

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* The exudation corpuscles and granules coating the vessels taken from the *corpus striatum* were shown by me on the following day to Drs John Reid, Duncan, and Mr Goodsir.

It has long been considered that a form of softening takes place independent of inflammation. The circumstances on which this depends may be considered unknown. In the meantime, I am desirous of calling attention to a fact, which, as we shall see, is of some importance, viz. that there are two kinds of cerebral softening, the histological elements of which materially differ.

OBS. VII.—*Paralysis of the upper extremities; contraction of the left arm; convulsions; coma; convulsive action of particular muscles; death three months after commencement of the disease; several circumscribed portions of the brain and cerebellum softened; numerous exudation corpuscles and granules in the softened portions.*

Daniel M'Intosh, aged 58, admitted into the Royal Infirmary, May 25th 1842, under Dr Henderson. He is a painter, of temperate habits. He was in perfect health until three weeks before admission, when he experienced weakness first of the right hand, and immediately after of the left. There was also a sense of weight in the head, and vertigo on moving about. On admission, there was no pain in the head, but he complained of general weakness, languor, and drowsiness. He could grasp with the hands, but not forcibly; the left had least power. The sensibility was unaffected; pupils contractile on the approach of light. June 8th, Since last report, the left upper extremity has been growing more and more paralytic, so that he can neither bend or extend it fully. The fore-arm is contracted upon the fore-arm; when forcibly extended, it is brought without any effort of his own into the semiflexed position. Intelligence and sensation unaffected. The left pupil was a little more contracted than the right one. Had full command over the movements of the inferior extremity. Pulse 90 and full. 22d, Lies in a lethargic state, but answers questions when spoken to. Paralysis of both upper extremities complete; lower limbs freely moved in bed. Evacuations pass involuntarily. No pain in the head or paralysis of the tongue. Pulse 66. 27th, Was seized with an attack of partial convulsions on the 25th, again on the 26th, and he had a third last night. In the first two attacks, the right side of the face only was affected; in the last one, the right arm also. Otherwise the same. 29th, During last night the convulsions returned. This morning he was completely comatose. There are no signs of sensation; pricking the feet, however, caused twitchings in the limbs. 30th, The partial convulsions have returned. In these attacks the right arm from the shoulder to the fingers is affected with short convulsive succussions, and on their ceasing, the left arm became similarly affected, and gradually the left side of the neck and abdominal muscles. The spasmodic action affected the extensors only; the limbs were never flexed by them. The right cheek is paralysed. July 1st, Has recovered sensation. Speaks when spoken to, and protrudes the tongue. The paralysis of the right cheek has disappeared. The sensibility both of the upper and lower extremities is perfect. 2d, The convulsions returned during the night, affecting both upper extremities. 3d, Loss of consciousness. Pulse 108. Respiration 40 in the minute. The convulsive succussions of single muscles continue; sometimes the left sterno-mastoid alone, sometimes the left pectoral or the right Trapezius, and the extensors of the wrists and fingers. The mouth is open, and the right cheek paralysed. The iris retains its sensibility. Died at 4 P. M.

Sectio, July 4th. Body much emaciated. On the upper surface of the posterior lobe of the left hemisphere an abscess existed containing about ʒi. of turbid serum, and the adjacent substance was softened. On the surface of the outer and lateral portions of the same hemisphere there existed a softened portion about the size of a small nut. It was circumscribed, of a reddish-tinge, and diffluent towards the centre. A similar lesion existed on the surface of the posterior lobe. There was a third on the surface of the left hemisphere, in a position similar to that on the right, and about the same size, and a fourth was found on the surface of the posterior lobe. On slicing the brain ʒiss. of fluid was found in each ventricle. In the substance of the brain a fifth circumscribed softened portion was found in the anterior lobe of the right hemisphere, near its inferior surface, one inch and a-half anterior to the Sylvian fossa. A sixth existed in the lower part of the left optic thalamus, a little above the extremity of the inferior cornu. Both these latter were about the size of a pea. A seventh was detected in the lateral portion of the same hemisphere, the size of a shilling. This was more pultaceous than the other softened portions in the substance of the brain, but not so much so as those on the surface. The left lobe of the cerebellum contained a similar circumscribed softened portion, about the size of a hazel-nut, a second smaller one behind it, and there was a third in the *tuber annulare* on its inferior surface. This latter extended a little more to the left of the mesial line than to the right. The vertebral arteries were much thickened, their coats studded with opaque deposits, and their calibres enlarged.

The smaller of the softened portions above-mentioned were distinctly circumscribed, generally round, and of a light-red colour. Their surface, as exposed by section, was granular and uneven. In the larger the circumscription was less definite, both as to colour and consistence. The central portions of these were reduced to pulp by the slightest handling. In some the cerebral texture was entirely destroyed, and reduced to a fluid consistence. In these the cavities were lined by a membrane, which displayed a ramification of vessels.

The heart was large, weighed 12½ ounces. No unusual dilatation of its cavities. Aorta of small calibre.

Microscopic Examination.—It would have been interesting to have examined the various softened portions in this case, and determined the differences existing between them. The inspection, however, took place when I was absent from town, and I had only the opportunity of examining one of the softened portions, which Dr Peacock was so good as to preserve for me in spirits. In this the softening was very circumscribed, and appeared to have been dug out of the healthy cerebral structure. It contained numerous exudation corpuscles, masses and granules, both isolated, and coating the vessels externally. The walls of the corpuscles were somewhat contracted and shrivelled, apparently from having been kept in spirits. The healthy-looking cerebral texture immediately surrounding this was normal in every respect.

Remarks.—In this case weakness of the hands was the first symptom observed, followed by gradual paralysis and contraction of the left arm. Then follows a state of lethargy, with paralysis confined to the upper extremities, spasmodic action of certain muscles, coma and death. Instead of finding a considerable part of one or both hemispheres softened, ten isolated softened portions, more or less circumscribed, were discovered. It may be asked how far do these isolated patches of softening explain the circumscription of the paralysis to the superior extremities, and the spasmodic action of particular muscles? It should be observed that, on the whole, the amount of softening on the right side of the brain was greater than that on the opposite one, which accounts so far for the paralysis and contraction having been first and most powerfully manifested on the left side. The microscopic examination was incomplete in this case; but I am assured that all the softened portions were of the same character. Dr Peacock also examined three or four of these with the microscope, and informed me that they all presented the same appearance of exudation corpuscles.

OBS. VIII.—*Mental weakness with incoherent speech; hemiplegia of the left side; orthopnœa; death about six weeks after appearance of the disease; extensive softening of the right hemisphere, and central parts of the brain; aneurism of the arch of the aorta; numerous exudation corpuscles and granules in the softened portion.*

Thomas Dodds, aged 60, admitted into the Royal Infirmary, July 4th 1842, under Dr Craigie. This man was of a copper-colour, a native of Bombay, but has been residing many years in Edinburgh.

The history of this man's case was, from accidental circumstances, not taken during life. The following particulars, however, were obtained from the nurse and his friends, subsequent to his decease. On admission he stated that he had been latterly labouring under fever. His intelligence was much affected; he answered questions at random and without meaning. He was sometimes restless and irritable, muttering to himself. The left arm and leg appeared paralyzed. In this state he continued several days. Latterly his respiration became much affected. For the last fortnight he laboured under orthopnœa, could not lie down, but reposed with his chest elevated, and lying towards the right side. Had alternate attacks of diarrhœa and constipation. Died August 9th.

Sectio, August 10th.—The head was remarkably small; body emaciated; the skull was of unusual thickness; the *dura mater* thick and opaque; there was slight subarachnoid effusion, elevating the membrane to the level of the convolutions; ℥ii. of clear fluid were removed from the ventricles, and about ℥iii. from the base. The fornix and adjacent portions, together with a large central portion of the right hemisphere, were soft, of a white colour, and easily broken down by handling, and on pouring a stream of water over it. Somewhat in front of the fissure of Sylvius there existed a softening, involving the convolutions to about the size of a nutmeg, and extending internally about three-fourths of an inch. This softened portion was pultaceous and diffluent on the surface and in the centre, and became more consistent towards the periphery, gradually terminating in the healthy structure of brain. On the external surface of the right lobe of the cerebellum, there was a dark yellowish spot, the size of a sixpence. On division it was found to be the external portion of a tumour, which was about the size of a walnut, and of tolerably firm consistence. It presented all the characters of *fungus hæmatodes*, containing in its centre a small collection of pus.

The right lung was firmly adherent to the parietes of the chest by false membrane. An aneurism the size of a large orange arose from the aorta, about one-third between the origin of the innominata and heart, and pressing against the sternum, causing absorption of the bone; also compressing the right lung. The lining membrane of the aorta coated with osseous plates; the heart was large, and adherent to the pericardium by old adhesions; the right ventricle was firm in its coats, and its cavity small; both the walls and *columnæ carneæ* of the left ventricle were much hypertrophied; the mitral valve was opaque and thick, and on the free edges of the aortic valves were a few small warty vegetations. The stomach was small and contracted. The pyloric orifice in some degree strictured from hypertrophy of its cellular walls; intestines and other organs free from disease.

Microscopic Examination.—The whole of the white softening in the right hemisphere, fornix, &c. contained numerous exudation corpuscles. Fig. 9. In some parts numerous exudation granules were coating the vessels. There were tufts of vessels hanging loose in some parts of the pultaceous substance. Between the meshes of these were numerous granules and black-looking corpuscles, giving to the field of the microscope a smutty appearance. The vessels appeared colourless, and covered with loose minute black points. Fig 8. There were similar appearances also in the more circumscribed softening towards the surface of the right hemisphere. These were also very numerous in the substance of the cerebellum immediately surrounding the tumour, which presented the histological characters of some forms of *fungus hæmatodes*. The purulent fluid in the centre presented, under the microscope, the usual corpuscles found in healthy pus.

Remarks.—The phenomena indicating softening in this case were imperfectly observed. Obtuseness of intellect and hemiplegia were present, but the mode in which these symptoms appeared, together with any particular changes or modifications they underwent, escaped observation. It is important, however, to remark that the central softening, which was perfectly white, and was considered by the prosector to be the result of *post mortem* changes, presented the same histological characters as we have seen exist in the red acute softening.

OBS. IX.*—*Acute hydrocephalus; vomiting; diarrhœa; fever; convulsions; rigid flexion of the thumbs and great toes; irides insensible; coma; death three months after the appearance of the first symptoms; effusion of serum into the subarachnoid membrane, and into the ventricles; softening of the central portions of the brain; tubercular meningitis.*

Jane Frazer, aged 12 months, of strumous family and appearance, was first seen on the 8th of July 1842. Three months ago she was attacked with vomiting and diarrhœa, accompanied with a state of pyrexia. These symptoms disappeared in a fortnight, apparently the result of active treatment. Three weeks ago the child became restless, had vomiting after taking food, and loss of appetite. A week subsequently it could not support the head. Some days afterwards it became insensible, and occasionally extended its extremities convulsively. When first visited the body was observed to be much emaciated and blanched; the scalp was hot; the cheek and extremities cool. There was perfect insensibility; occasional convulsions of the extremities. The thumbs and great toes were rigid, and remained permanently flexed. The eyes were distorted; pupils contracted and insensible to light. Takes no food; tongue furred; bowels open; pulse 140, thready and irregular. (Stimulants; warmth to extremities.) 9th, Slight abatement in the symptoms; pulse less frequent. 10th, Convulsion more violent and frequent. In the afternoon these ceased and profound coma ensued, an hour after which death took place.

Sectio, July 12th 1842.—Head large. The fontanelles were not elevated. Eleven drachms of fluid were collected, which apparently flowed out from the fissure of Bichat. On elevating the calvarium several drachms more escaped The ventricles, however, still contained five drachms of a slightly turbid serum. The ventricles and foramen of Monro were much dilated. Serum was effused under the lining membrane of the ventricles, giving it an œdematous appearance. The *septum lucidum*, fornix, and central portions of the brain were of a pultaceous consistence, and brilliant white colour. The gray masses were of natural consistence. The membranes of the base contained minute round bodies, of a light straw or yellow colour, and hard consistence. There was a layer of lymph effused into the subarachnoid cellular tissue in the course of the middle cerebral artery. Five drachms more of fluid were collected from the base, and some escaped from the spinal canal.

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* For an account of the symptoms of this case I am indebted to Mr Bunce. The details of the dissection, and the opportunity of examining a portion of the brain, I owe to the kindness of my friend Dr Peacock.

The upper lobe of the right lung was condensed and of a deep purple colour. Two tubercular masses, the size of a pea, were observed, one imbedded in the lung, the other in a bronchial gland. On slicing the condensed portion, it was found filled with tubercular depositions of different sizes. The heart was healthy. The serous coat of the spleen contained numerous tubercular spots. One of Peyer's patches near the cæcum had its edges elevated, and surface ulcerated; other organs healthy.

Microscopic examination.—All the white central softened portions of the brain contained numerous exudation corpuscles. The most part of these were round, and exhibited the cell wall very distinctly, (Fig. 11.) Some were quite full of granules, in others there were only a few. By means of pressure the cell wall could easily be ruptured, and the granules caused to escape. These corpuscles were mixed with numerous granules, which also abundantly coated several of the vessels.

Remarks.—The peculiar symptoms of softening were in this case masked by the tubercular meningitis. To this latter cause may probably be attributed the vomiting, pyrexia, and insensibility with convulsions. The rigid flexion of the thumbs and great toes on both sides might be dependent on the softening; but it is difficult to analyze symptoms in children so young, on account of their great irritability and want of intelligence. It is important to remark that here also the softening was white, and that the exudation corpuscles, as in the last case, were very abundant.

OBS. X. *Phthisis; sudden impairment of the mental faculties and contraction of both arms; convulsions; coma; death six weeks after the commencement of the cerebral symptoms; arachnoid and pia mater adherent to the brain; softening in both hemispheres with infiltration of blood; effusion of scrofulous matter; numerous exudation corpuscles and granules in the softened portions.*

Thomas Wood, aged 28, admitted into the Royal Infirmary, October 12th 1841, under Dr Spittal. At this time he had been labouring under phthisis for some months, which disease continued gradually to progress without any remarkable symptoms, until March 23d 1842. On this day he was suddenly seized with a violent fit of coughing, and pain in the head, neck, and chest, with prostration of strength. The eyes were incessantly turned towards the right side; the pupils became dilated, and very slightly sensible to light. The left arm became motionless, lost its sensibility, while the fore-arm was rigidly flexed upon the arm. The right arm, also, was slightly contracted, but the power of motion was uninjured. The lower extremities were unaffected. The intellectual faculties were impaired, and he talked childishly. The pulse was 120, and the inspirations

36. 24th, He had several attacks of convulsions affecting the muscles of the four extremities. The pupils were dilated and nearly insensible. Pulse 96. 25th, He again became sensible, and the pupils were more contractile; pulse 112; tongue white. During the 26th, 27th, and 28th, he continued in a state of incessant restlessness and excitement, rendering it somewhat difficult to restrain him, and talking loudly and constantly. From this state, he gradually recovered; the head symptoms subsided; the chest affection gradually making progress. No particular symptoms occurred until May 12th, when he complained of pain in the upper and fore-part of the head; his intellectual faculties were also confused. (Leeches to the temples; head to be shaved, and blister applied). 14th, Little change; tremor of the extremities; pulse 112, weak. (Four ounces of red wine.) 16th, Lies in a lethargic state, but is restless at night, attempting to get out of bed. Pulse 112; still weaker than yesterday. Evacuations passed involuntarily. (Stimulants.) Continued to sink, and died on the 19th.

Sectio, May 21*st*.—Great flattening of the convolutions on the left side of the brain, and obliteration of the intervening spaces. The external surface was of a salmon-colour. The arachnoid and *pia mater* were adherent to each other and to the convolutions. At the lateral portion of the anterior lobe a dark opaque spot gave rise, on touching it, to a sensation of fluctuation. On slicing the brain, it was found that this spot communicated internally with a softened portion of brain, of about an inch and a half diameter. This softening contained much effused blood, which was sprinkled throughout its extent in the form of innumerable red dots, most aggregated together immediately round the centre, which was hard and semitransparent-looking, from the apparent deposition of scrofulous matter. The white matter surrounding the softened portion was of a delicate straw-yellow colour, which gradually grew less externally, till it disappeared. A similar softened portion, although less in extent, and not so much spotted with blood, existed in the right lobe, above the posterior cornu of the lateral ventricle. The two ventricles together must have contained one ounce of serum. There was also considerable serous effusion at the base, and opacity and thickening of the membranes, especially about the optic commissure.

The lungs were adherent on both sides. The right was infiltrated with tuberculous matter, both in its superior and inferior lobes, and contained numerous cavities posteriorly. A considerable quantity of tubercular deposition in a miliary form also existed in the left lung, with some cavities and emphysema. The heart was healthy. Patches of lymph on the surface, and in the course of the vessels. There were adhesions between the reflected portions of the pericardium and the aorta.

At the upper portion of the ilium, tubercular matter was deposited in the vesicles of Peyer's glands, surrounded by an effusion of coagulable lymph, but without ulcerations. The cæcum was studded throughout its whole surface with ulcers, and many existed in the ascending, transverse, and descending colon. In the first, they were of an irregular form, and sometimes an inch broad; in the last, they were small and oval. Some tubercular matter was effused on the surface of these ulcers, and in some of the solitary glands.

Microscopic Examination.—The softened cerebral substance, containing the dotted effusion of blood, on both sides presented under the microscope numerous exudation corpuscles. The medullary matter surrounding this on the left was not softened, and its minute structure was in every respect normal. The colourless scrofulous matter exuded into the centre of the softened portion was composed of numerous granules, with occasional loose fragments of broken down cells, similar to the tubercular matter found in the lungs and other textures.

Remarks.—In this case the cephalalgia, distortion of the eyes, dilatation of the pupil, convulsions, restlessness and excitement, indicated inflammation of the membranes, whilst the peculiar confusion of intellect, conjoined with paralysis and contraction of the extremities, indicated medullary softening. These symptoms disappeared for nearly a space of six weeks, then returned in an aggravated form and proved fatal. Considerable meningeal inflammation was found, and softening existed in both hemispheres, so far explaining why contraction and paralysis occurred in both arms. It is singular, however, that the inferior extremities should have entirely escaped. In conjunction with this fact let it be observed, that the organic lesion existed above and external to the *corpora striata* and *optic thalami*, neither of which were directly implicated. The infiltration of blood constitutes what Cruveilhier has denominated capillary apoplexy; that is to say, the blood, instead of being poured out from a large trunk, is effused from the capillaries,—a result which is frequently preceded and caused by softening. This softening contained the same microscopic corpuscles we have demonstrated in similar lesions dependent on inflammation. The hospital report states that the straw-yellow-coloured substance surrounding the hemorrhage was soft. I was careful in examining into this point, and could perceive no physical evidence of softening, in much of the substance so coloured. Microscopic examination evinced nothing abnormal except in its central portion. Is it not probable that the colour in this instance may be owing to the imbibition of the colouring matter of the blood into the cerebral texture surrounding the extravasation, similar to what occurs in the ecchymosis of other tissues? Is it not even likely that the yellow tinge surrounding many specimens of inflammatory softening is owing to this cause? At all events, the present case demonstrates that the extent of colour is no index to the extent of softening.

OBS. XI.—*Apoplexy; hemiplegia of the right side; death in seven days; large coagulum in the left hemisphere, the cerebral substance* *surrounding which was softened; exudation corpuscles, masses and granules in the softened portion.*—Ann Campbell, about 60 years of age, admitted into the Royal Infirmary under Dr Traill. February 13th 1842, She was suddenly seized with apoplectic symptoms on entering a house, and fell down insensible. She was immediately bled, and then sent to the infirmary. When admitted it appeared that she had been drinking. Pulse 90; respiration quick but regular; there was complete paralysis of the right side; the face was drawn to one side; the iris moved naturally when stimulated by light. She could not speak, but was partially sensible; the fæces and urine were evacuated involuntarily. In this state she lingered, and died on the 20th, half-past 4 P. M.

Sectio, February 22. The vessels of the *dura mater* were much congested. Slight subarachnoid effusion; there was a large coagulum of blood, two and a-half inches in diameter, in the left hemisphere, extending to near the base, and situated immediately external to the wall of the left ventricle. The cerebral substance immediately surrounding the clot was softened, and of a rusty brown colour, extending in some places a quarter of an inch deep.

Microscopic Examination.—The softened portion surrounding the clot contained numerous exudation corpuscles, masses and granules, both isolated and attached externally to the vessels. The granules effused between the loop-like nets of the intermediary vessels were so numerous as to impede the passage of transmitted light.

OBS. XII.—*Sudden hemiplegia of the left side; death in five weeks; hemorrhage into the substance of the right thalamus; surrounding cerebral substance softened; exudation corpuscles, masses and granules in the softened portion.*

William Sutherland, aged 46, a mason, admitted into the Royal Infirmary April 13th 1842, under Dr Christison.

On the 15th of March he was suddenly seized with loss of power in the left arm, spreading rapidly to the corresponding leg, but without any general loss of sensibility or apoplectic symptoms. He was immediately bled freely from the arm, leeches were applied to the head, and other depleting measures had recourse to. On admission the left leg was more emaciated than the right. The sensibility was little affected, and he was able in some degree to move the ankle. The sensibility of the arm was more impaired, and he was only able to move the fingers very partially. The angle of the mouth was drawn to the right side, and the top of the tongue to the left. He passed his fæces and urine in bed, and had sores on the nates and hips. Pulse in the right arm firm and full, in the left small and weak. Died at half-past 1 P. M. on the 25th.

Sectio, March 26th. The membranes of the brain normal. One drachm of clear fluid existed in the two ventricles united. An extravasation about the size of a hen's egg was found in the substance of the right thalamus, passing partly into the *corpus striatum*, and deep into the substance of the brain, in the course of the inferior cornu of the ventricle. The coagulum was throughout of a brownish-red colour, passing into yellow. The cerebral substance surrounding it was soft, pultaceous, and readily removeable by a current of water. In the under portion of the left *corpus striatum* there existed the remains of a small cyst. Some little fluid was found at the base. The arteries were healthy.

The opposite layers of the pericardium were adherent from effused lymph of old date. The left ventricle was very much hypertrophied, and its cavity small; the mitral valve was slightly opaque; the aortic valves were ossified at their attached margins; aorta somewhat dilated.

There were some few granular tubercles scattered in the lungs. Other organs healthy.

Microscopic Examination.—The softened substance surrounding the clot exhibited several exudation corpuscles, masses, and granules as in the last case. They were, however, not so numerous.

Remarks.—The two cases just given are very similar to each other. In both, the attack was sudden; in both, hemiplegia existed; in both, a large hemorrhagic extravasation occurred in the substance of the hemisphere opposite the paralysed side; in both, the cerebral substance around the clot was softened, and in both, this presented the same histological appearances. It should be observed, however, that in the first case the coagulum was much larger than in the second. That death occurred in the one, seven days, and in the other, five weeks after the hemorrhage, and that in the former the exudation corpuscles, &c. were more abundant in the softened matter. The absence of loss of consciousness also in the second case, notwithstanding the presence of so large a clot, is deserving of notice.

OBS. XIII.—*Concussion; loss of consciousness; partial recovery; occasional delirium; relapse; death fourteen days after the injury: hemorrhage into the cavity of the arachnoid covering the right anterior lobe; partial softening of the convolutions; small apoplectic cyst in the right cerebral lobe; fracture at the base of the cranium; exudation corpuscles and granules in the softened convolutions.*

George Clelland, aged 51, admitted into the Royal Infirmary, under Dr Paterson, July 25th 1842. When brought into the house he was insensible, in which state he had been found in the streets by the police. In the afternoon his consciousness returned, and he stated that, on the 21st, he fell down a stair, ten or twelve steps in height, and struck his head, after which he was partially insensible, and a quantity of blood flowed from his left ear. On the 24th, he felt better, and went out to walk, when he was found by the police, and brought to the hospital on the next morning. On admission he was suffering much from pain in the head, and a bloody fluid flowed from the left ear to the extent of a tablespoonful. He was partially insensible. August 2d. The preceding symptoms have gradually disappeared, and at the hour of visit he was quite sensible and felt strong. In the evening he became restless, and at times delirious. 3d. To-day he dressed himself, and went to the top of the stairs, with the intention of going out into the garden. He was, however, persuaded to return to bed. He continued restless and rambling until two o'clock A. M. on the 4th, when he lost all consciousness. The pulse was 54, and he breathed stertorously. Bled to twenty-two ounces. At the visit the pulse was 72, and intermittent. Turpentine enema; blister to the scalp; died at half-past three P. M.

Sectio, August 5th. Cranium unusually thin. On the right side the *dura mater* was separated to a considerable extent from the *os frontis*. An extravasation of blood was found in the arachnoid cavity, extending over the anterior and lateral portions of the right hemisphere. The clot in contact with the *dura mater* was firm, decolorized, and formed membranous flakes, which could readily be torn off. Near the convolutions of the brain the clot was grumous, semifluid, of a chocolate or rusty brown colour. A superficial layer of the convolutions was broken down and pultaceous. In the course of the fissure of Sylvius, the brain to the extent of a small walnut was soft, and of cheesy consistence. The coats of the cerebral artery were thickened, and presented some opaque spots. A small apoplectic cyst, with a dark coagulum, the size of a hazel-nut, was found in the substance of the right hemisphere in its anterior lobe. Other portions of the brain healthy. The petrous portion of the left temporal bone was traversed by a fracture, extending two inches upwards and inwards, passing directly through the internal ear.

Microscopic Examination.—The grumous layer of blood and superficial softening of the cortical substance presented nothing but a granular mass, consisting of broken down blood globules and cineritious matter. The circumscribed softening in the course of the Sylvian fissure contained numerous exudation corpuscles and masses. Several of these were of very large size, measuring from one-twentieth to one-fifteenth of a millimetre in diameter. (Fig. 12.) The cerebral substance surrounding the small apoplectic effusion, also full of numerous exudation corpuscles, masses, and granules.

Remarks.—It is interesting to remark the great difference between the symptoms in this, and in the two last cases, in connection with the *post mortem* appearances. In the present instance there was no paralysis, the restlessness, delirium, but power of moving the limbs, indicating a lesion at the surface of the cerebrum. In the former cases the intellect comparatively was little affected, the principal symptoms being paralysis, and in these the lesion occupied the central portions of the brain. In this case should also be observed, that a superficial softening of the convolutions existed, arising apparently from infiltration of blood and serum, which contained no exudation corpuscles, and that another circumscribed softening contained them in abundance. It may be asked to which of these two lesions was the irritation and excitement owing? The fracture on the opposite side of the cranium arose from *contre-coup*.

Obs. XIV.[*]—*Hemiplegia of the left side; congestive headach; sudden apoplexy; profound coma; death two days after the attack; large extravasation of blood into the right hemisphere, surrounded by softened and pulpy brain; absence of exudation corpuscles or granules in the softened portion.*

Jane Chalmers, aged 72, living in the Charity workhouse as nurse. Five years ago she was seized with sudden loss of consciousness, and hemiplegia of the left side. From this she slowly recovered, the speech, however, remaining thick and impaired, the memory being somewhat defective, and the power of the left side diminished. She continued to enjoy tolerable health, and move about, only complaining of occasional headach, until twelve months ago, when she was seized with vertigo and confusion of intellect, threatening another attack. This, however, passed off, and she continued as formerly until August 4th 1842, when, on receiving some unpleasant news, she suddenly fell down in a state of coma. This soon became very profound. The pupils were dilated; there was perfect resolution of the limbs; respiration natural; pulse full, not frequent. In this state she continued until the 6th, and then expired.

Sectio, August 8th, two o'clock. The vessels of the *dura mater* were rigid and distended with blood. Venous congestion of the meninges; arachnoid dry; convolutions of the right side flattened and pressed together. The left ventricle was much dilated, and contained more than ʒi. of clear fluid. On looking into it from above, a clot the size of a walnut was seen protruding into it through the *septum lucidum*. On slicing the right hemisphere, the posterior and middle lobes were found to contain clotted blood, to the amount of nearly ʒiv. This had broken through the *septum lucidum* into the left hemisphere. The coagulated blood was of a dark-red colour, of firm consistence, and everywhere evidently recent. The cerebral substance immediately surrounding it was of a pulpy consistence, and in some places infiltrated with blood. The other portions of the cerebral substance were healthy. The basilar and other arteries at the base of the brain were rendered more or less rigid by calcareous depositions in their coats.

Microscopic Examination.—The softened cerebral substance surrounding the clot was carefully examined at numerous points, but there was no evidence of exudation corpuscles. The tubes of the brain, however, were readily separated from each other, and easily demonstrated.

Remarks.—The history of this case indicates a strong disposition to congestive attacks of the brain. The hemiplegia which had so long existed previous to the last fatal attack, probably depended on hemorrhagic effusion into the right hemisphere. The large clot discovered on dissection, however, was so extensive as probably to have obliterated all traces of it. The extent of this effusion, pressing on both hemispheres, explains the resolution of the extremities on both sides. The absence of delirium, convulsions, and all symptoms of irritation, indicates that inflammatory action had not occurred. In connection with this should be remarked the absence of exudation corpuscles in the softened cerebral substance, and the short time which elapsed between the occurrence of the attack, and the fatal result.

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[*] Dr Smith kindly invited me to be present at the examination of this case, and to him I am indebted for the details regarding it.

OBS. XV.—*Cephalalgia; loss of speech; convulsive action of the muscles of the face and neck; death five days after the attack; capillary apoplexy of the left corpus striatum and optic thalamus; softening of the septum lucidum, fornix, corpora striata, and optic thalami; absence of exudation corpuscles in the softened cerebral substance.*

Helen Morton, aged 18, admitted into the Royal Infirmary, September 6th 1841, under Dr Graham. This girl has never had any catamenial discharge, but has always enjoyed good health until about four months since, when she was attacked with severe pain in the frontal region of the head, which was increased by stooping. This was removed by the application of leeches to the temples. She remained well until September 2d, when the pain returned as before. She took some opening medicine, which was followed by purging on the morning of the 3d; vomiting supervened, and she brought up some slimy greenish matter. The cephalalgia, occasional vomiting, and purging continued until the evening of the 5th. She was then seized with insensibility and loss of speech. She continued in this state until she entered the Infirmary in the evening. On admission the face was flushed; temperature of the scalp was increased. There was some convulsive action of the muscles of the neck and face; leeches were applied to both temples. At 11 P. M. she was bled to ℥xii. which appeared to lessen the convulsive action somewhat. There was no buffy coat on the crassamentum of the blood. She continued in this state till 1 A. M. of the 7th, when she expired.

Sectio, September 8th.—The *dura mater* was tightly stretched over the convolutions, which were flattened and pressed together. The surface of the brain was of a waxy hue. Two drachms of serum in the ventricles. All the central portions of the brain, the *septum lucidum*, fornix, both *corpora striata* and optic thalami were softened, and in some places pultaceous. The *corpus striatum* and optic thalamus of the left side were of a port-wine colour, from the infiltration of blood. Towards the circumference, the red coloration was less intense, of a bright scarlet, and dependent on the greater or less aggregation of numerous minute circular dots. There was no distinct clot, or yellow coloration, the softening being of a pearly whiteness, All the other organs were healthy.

Microscopic examination.—Throughout the whole of the softened portion, no exudation corpuscles could be detected. Each little dot of blood, of which the extravasation was made up, consisted of nothing but numerous blood-globules, surrounded by the healthy structure of the brain.

Remarks.—In this case we observe a girl of eighteen years of age, in whom the catamenia had not appeared, subject to strong congestive headachs. Two days before death apoplectic symptoms manifested themselves. The meagre details received in connection with this case leave much to be decided. Vomiting, for instance, occurred two days before the attack, but as this symptom followed the administration of a cathartic, and accompanied purging, it may probably be attributed to the medicine rather than to any serious lesion of the brain. Convulsions of the muscles of the neck and face were also mentioned; their nature, however, is not described, and they were too limited to have depended on extensive arachnitis, or central acute softening. The *post mortem* appearances found after death in the brain were sanguineous infiltration into the left *corpus striatum* and optic thalamus, with softening of those parts and of the central portions of the brain. We have observed a similar kind of capillary apoplexy in Observation IX., and similar white softening in Observations VII. and VIII. In these three cases, however, numerous exudation corpuscles existed in the softening, whereas it is important to observe, that, in the present instance, no such microscopic bodies could be detected. It is worthy of remark, also, that the softening was colourless, of a pearly white, similar to the eye to that described in Observations VII. and VIII.

Now, if the symptoms of this case be compared with Observations I. II. and III. or others where the *corpus striatum* and optic thalamus were equally involved, the absence of all paralysis will be at once remarked. If, again, the symptoms be compared with those of Observations VII. and VIII. where central softening existed, or with any other cases where this lesion existed to a similar extent, we shall be struck with the absence of the peculiar dulness of intellect, and of all rigidity in the limbs. The progress of the case, also, is very different from that usually accompanying inflammatory softening. There was no return of the intellectual faculties, no impairment of memory or comprehension, none of the phenomena characteristic of that disease. In short, the symptoms were those of sudden apoplexy alone, similar, with the exception of the limited convulsions, to what we have observed in simple hemorrhage into the brain, Observation XIV. The absence of delirium and convulsions of the extremities indicate freedom from meningitis, and the whole history of the case readily distinguishes it from inflammatory softening.

Obs. XVI.*—*Trismus; opisthotonos; death twenty days after the appearance of the tetanic symptoms; softening of the spinal cord; absence of exudation corpuscles in the softened portion.*

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* For the particulars of this case I am indebted to Dr Douglas, at that time one of the surgical clerks.

Georgina Cumming, aged 27, admitted January 29th 1842, into the Royal Infirmary under Mr Syme. This woman is of a stout habit of body, and fat. She is stated to have previously laboured under violent hysterical symptoms. About a year ago she suffered from symptoms of phlebitis, which followed an operation for the obliteration of varicose veins. She subsequently fell into a state of melancholia, amounting to dementia, which continued a week or two, and then disappeared.

According to her own account, she has been exposed during the last three weeks to cold and fatigue. Ten days ago she had violent and continued rigors, loss of appetite, stiffness, and pain in the lower jaw, succeeded by pain and cramps in the shoulder and back. Has had no constipation.

On admission the symptoms were, flushed face, compressed lips, (*risus sardonicus*), anxiety of countenance, the sensation of a ball rising in the throat; paroxysms of weeping and moaning, caused by fear of "lock-jaw;" clammy perspiration; pulse 130, of moderate strength; there was perfect trismus. The jaws could only be separated so as to admit the point of the little finger. All the muscles of the back were very rigid. There was considerable tenderness over the maxillæ and the right scapula, but none over the spine. Occasional attacks of opisthotonos, during which the back was curved so as to rest upon the hips and shoulders. The articulation was indistinct. (Assafœtida and morphia; mercurial and belladonna ointment to be rubbed on the spine.) 30th. Face flushed; tetanus continues, with pain in the affected muscles. Slight pain on pressure over the seventh and fifth dorsal vertebræ; respiration laborious; spasms of opisthotonos recur at intervals; limbs not affected. (Blister to the spine; enemata of turpentine and assafœtida.) 31st. Slight remission of the symptoms. February 1st. Great anxiety of the countenance; respiration hurried; deglutition difficult; otherwise the same. (Tobacco injections every three hours.) After the first injection, there was a violent attack of opisthotonos, during which the extremities also were rigid. (Head to be shaved and ice applied to it and the spine.) February 4th. There has been a slight alleviation of the symptoms. To-day the spasms returned with violence. During the 5th and 6th there was little change. February 7th. This morning she had an unusually severe spasm. Since then the rigidity has continued; tracheal rale; pulse feeble; temperature of the surface low; mind unaffected; died at 6 P. M.

Sectio, 30 hours after death.—The brain and spinal cord were completely exposed. No lesion could be found except in the lower portion of the spinal cord, where opposite the 11th and 12th dorsal vertebræ, it was softened, and in some places broken down into a pultaceous mass, but of the natural colour. The lower lobe of both lungs was much congested and condensed, so as to sink in water.

Microscopic Examination.—The nervous tubuli of the spinal cord in its softened portion were in every respect healthy, and were easily demonstrated. No exudation corpuscles, masses, or granules could be anywhere discovered. This examination was made very carefully at numerous points of the softened mass, both in its white and gray portions. Dr Peacock was present, and confirmed the results.

Remarks.—The symptoms at the commencement of this case were those of well-marked hysteria. There had been no indications of pain or abnormal sensations referable to the limbs. There was no paralysis of the trunk or inferior extremity, and absence of all local spinal symptoms corresponding to the lesion found after death. These circumstances are opposed to the existence of myelitis. Several cases, however, have been recorded where similar lesions have been found after death, without any symptoms which could be attributed to them. I have pointed out in another place,[*] that such lesions may most probably be attributed to *post mortem* violence in opening the spinal cord, having often seen them accidentally produced by the saw or chisel in the hands of very expert dissectors. It is highly probable that such was the case in the present instance, not only from the absence of any symptoms which could be attributed to such a lesion, but from the non-existence of those appearances which, as must have been previously observed, accompany every inflammatory softening. In another case, also, to which I shall subsequently allude, one of the assistants opened the spinal column, and produced spinal softening with the saw, which presented similar appearances both to the eye and under the microscope.

I am unwilling at this stage of the inquiry to advance any conclusions, from what may be considered insufficient data. Some of the facts which have been elicited, however, may be here indicated.

The preceding series of observations have confirmed the statements of Gluge and Valentin, regarding the presence of exudation corpuscles in softening of the brain. They have further demonstrated:

1st, That the microscopic bodies peculiar to cerebral softening may occur primarily in the form of granules, masses, and nucleated corpuscles.

2d, That these so-called exudation granules, masses, and nucleated corpuscles may be observed coating the blood-vessels externally, clearly indicating their origin.

3d, That they are found equally in the red, yellow, and white softenings of the brain: in what has been considered chronic as well as in acute softening.

4th, That the softenings in which these bodies have been detected, both from their appearance and from symptoms which have accompanied them, are of an inflammatory nature.

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[*] Library of Medicine, Article Paralysis, Vol. ii. pp. 288 and 288.

5th, That these bodies have been found in great abundance where no appearance of softening or inflammation was evident to the naked eye, yet where the symptoms of such lesions were well marked.

6th, That white and yellow softenings may exist without the presence of exudation corpuscles, masses or granules, but that the symptoms which accompany these are not those indicating inflammatory softening.

7th, That the red, yellow, or white softenings are in no way dependent upon or connected with the infiltration or presence of pus.

The importance of these facts, both as regards the pathology of softening, as well as respects our knowledge of the subject of inflammation, will be dwelt upon in a subsequent part of this paper.

(*To be Continued.*)

EXPLANATION OF PLATE V.

The figures represent different portions of inflamed brain, as seen under a magnifying power of 300 linear diameters.

Fig. 1. Exudation masses and corpuscles, as seen in the red softening of medullary matter, (Obs. I.)

Fig. 2. Exudation granules and broken down cells, as seen in the diffluent yellow softening of the *corpus striatum*. (Obs. I.)

Fig. 3. Exudation corpuscles in the medullary matter at the edge of the softened portion. (Obs. I.)

Fig. 4. Exudation masses and granules coating the blood-vessels in yellowish red softening of the *corpus striatum*. (Obs. II.)

Fig. 5. Exudation masses and granules, both loose and coating a blood-vessel in what appeared to the naked eye healthy medullary substance. (Obs. VI.)

Fig. 6. Exudation corpuscles of a nucleated character, both loose and attached to blood-vessels, in softened medullary substance. (Obs. IV.)

Fig. 7. Exudation corpuscles and granules, densely crowded together between the vascular ramifications. (Obs. IV.)

Fig. 8. Exudation corpuscles, masses, and granules crowded together in a similar manner, giving the field of the microscope a smutty appearance. (Obs. VIII.)

Fig. 9. Appearance of the softened medullary substance of a pultaceous consistence, (Obs. VIII.)

Fig. 10. Appearance of the medullary substance rendered diffluent. (Obs. III.)

Fig. 11. Exudation corpuscles with distinct cellular walls, found in white central softening of the brain. (Obs. IX.)

Fig. 12. Large exudation masses and corpuscles, found in cheesy softening of the convolutions. (Obs. XIII.)

ART. VII.—*An Inquiry into the Anatomy of the Par Vagum and Spinal Accessory of the Eighth pair of Nerves.* By JAMES SPENCE, Surgeon, Member of the Medico-Chirurgical and Anatomical Societies of Edinburgh, and Assistant Demonstrator of Anatomy in the University of Edinburgh.

THE *par vagum*, or pneumogastric division of the eighth pair, has hitherto presented a kind of anomaly in the physiology of the nervous system; for whilst this nerve has two true ganglia on the upper part of its course, numerous experiments prove that it sends off motor, as well as sensitive branches. Arnold, Scarpa, and Bischoff attempted to explain this by conjecturing that the motor filaments of the vagus were derived from the spinal accessory, which they believed stood in the same relation to the *par vagum* that the anterior roots of the spinal nerves do to the posterior. Bischoff was further strengthened in this opinion by an experiment; for, having cut the spinal accessory within the cranium of a goat, he found, that, as the roots of that nerve were divided, the voice became gradually weaker, and was lost entirely when the nerve was completely divided; from this he concluded that the motions of the larynx were dependent on the filaments derived from the accessory—a conclusion by no means warranted, however, when we consider how many other causes were present which might have produced this effect, such as the loss of blood and the protracted sufferings of the animal during the preliminary steps of the operation.

In 1837, a most elaborate dissertation on the functions of the various branches of the eighth pair, the result of numerous conclusive experiments, was published by Dr John Reid in the Edinburgh Medical and Surgical Journal. The results of these investigations as regards those branches of the vagus, the anatomy of which I am about to consider, may be briefly stated as follows: 1*st*, that the pharyngeal branches of the vagus are purely motor. 2*d*, that the superior laryngeal branch is sensitive, giving rise to no movements of any muscle of the larynx except the crico-thyroid. 3*d*, that the recurrent laryngeal is a purely motor branch, supplying all the muscles of the larynx except the crico-thyroid. Dr Reid having satisfied himself as to the functions of these branches of the vagus, next proceeded to investigate what were the functions of the spinal accessory in relation to its motor branches. His experiments on this point were performed by first depriving the animal of sensation, then opening the cranium rapidly, and irritating the origins of the nerves; he found that on irritating the spinal accessory no movements of the larynx could be perceived, although there were strong contractions of the Trapezius and sterno-mastoid, and in most cases, of the pharyngeal muscles also; but on irritating the origin of the vagus distinct contractions of the muscles of the larynx took place. From these experiments Dr Reid presumed that the vagus contained motor filaments independent of the filaments derived from the accessory. In 1841, M. Longet published a memoir on the same subject; and, although apparently unacquainted with the previous investigations of Dr Reid, his experiments and their results bear a strong resemblance to those of Dr Reid, with the exception of that regarding the relation of the accessory to the motor branches of the vagus. For M. Longet found that, on irritating the accessory within the cranium, distinct movements of the laryngeal muscles were produced, whilst no such effect followed on irritating the origin of the vagus; hence he is inclined to believe the conjecture of Arnold, Scarpa, and Bischoff, that the motor branches of the vagus depend upon its connection with the spinal accessory. I believe, however, that I can show from the anatomy of these nerves, that the results both of Dr Reid's and M. Longet's experiments might take place, and yet that these results are by no means subversive of each other, nor so contradictory as may at first sight appear.

At the commencement of last winter session my attention was particularly directed to the anatomy of the vagus and accessory, by a request from the late eminent and justly lamented Sir Charles Bell, to examine the ganglia on that nerve, as he was then engaged in writing a dissertation on its functions, which has since been published. Sir Charles was of opinion, that what is generally termed the inferior or second ganglion of the vagus, might, perhaps, be merely a plexiform arrangement of its fibres with those of the spinal accessory which join it immediately above that point, and that thus we might account for the vagus giving off both motor and sensitive branches in the subsequent part of its course. Whilst engaged in dissecting the pneumogastric in a recent subject, I was struck by the fact that its trunk appeared to consist of two distinct portions, one white and cord-like, the other and larger portion of a grayish colour. This was particularly the case near the lower ganglion, and on removing the neurilema, the white filamentous portion could be traced over this ganglion, a little above which it seemed to be formed by the internal root of the spinal accessory, and a small flat and white filament which I traced up over the superior ganglion of the vagus, but as the *medulla oblongata* had been removed, I was unable to determine its actual point of origin. I, however, showed the dissection to the late Sir Charles Bell, Dr Alison, Dr Allen Thomson, and Mr Mackenzie.

Some time elapsed before I could procure a subject fit for my investigations, as the majority of the subjects received had been previously opened, and the brain and *medulla oblongata* removed; but I repeated this dissection on two other subjects as far as I could, and with similar results.* Having at length obtained a subject with the brain and *medulla oblongata* entire, I commenced my dissection by tracing upwards the white nervous filament which I have mentioned as joining the internal root of the accessory. I found that, by careful dissection, I could trace it over the superior ganglion of the vagus, and found that it took its origin along with the other filaments forming the vagus from the groove between the olivary and restiform bodies; and here I also observed what I then considered filaments from the vagus passing back to join the spinal accessory within the cranium. I then traced the filament, of which I have been speaking, downwards, and found that, immediately below the first ganglion of the vagus, it was joined by the internal root of the accessory, the junction of these two forming a white firm nervous cord, which, after giving off the pharyngeal branch of the vagus, could be traced over the inferior ganglion on that nerve, and continued to descend parallel to and within the same neurilema as the greyish portion or trunk of the vagus; but unfortunately I was again prevented from obtaining any thing conclusive as to the connection of this portion of the nerve with the recurrent laryngeal, owing to the vagus having been divided higher up than where it gives off that branch.

Whilst engaged in prosecuting this dissection, I, for the first time, became acquainted with the investigations of Bendz, from a footnote in Dr Reid's paper on the vagus. It was there stated, that "from these dissections it is concluded that both in man and animals the *nervus pharyngeus* of the *par vagum* is derived in a great part from the filaments of the accessory, and that the *nervi laryngei*, superior and inferior, and the œsophageal plexus also receive a few filaments from this nerve. He also observed the accessory in man furnish a few filaments to the second ganglion of the *par vagum*. Into this second ganglion of the *par vagum* all the filaments of the vagus do not enter. He has even seen in the rabbit some of the filaments of the vagus pass the superior ganglion placed on this nerve, without entering into its formation." As it seemed from this that the dissections of Bendz were precisely similar to those which I had made, I wrote to Dr Reid for further information regarding them, as I could not myself get the original thesis of Bendz. Dr Reid in his answer says, "I suspect it is not correctly stated in my paper on the eighth pair, that Bendz had traced part of the filaments of the vagus past its superior ganglion in the rabbit, for on looking at the original it appears pretty clear that he means the inferior ganglion, so that if you are correct in supposing that you have traced filaments passing over the superior ganglion, your dissections differ from those of Bendz."

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* Sir Charles Bell at the same time offered a prize to the anatomical students for the best dissection of the eighth pair. This prize was afterwards awarded to my riend Dr Malcolm of Belfast, then a student at this university. His very beautiful dissection is now in the possession of his nephew, Dr Bell, and corroborates in a great measure the dissections which I am about to describe.

That there may be no doubt as to Bendz meaning the inferior ganglion, in the passage allude to, I subjoin the quotation from the original now before me. He is describing the anatomy of the nerves in the rabbit. "In quinque circiter linearum distantia *a ganglio radicis nervi vagi*, fibrae hujus nervi in *gangliolum* ovale 1½ longum et ¾' " crassum, colore griseo-rubicundo intumescit. Nonnullae fibrae a vago venientes formationis hujus *ganglioli participes non sunt*, sed immediate in nervum laryngeum superiorem transeunt, qui majore ex parte hisce formatur." I may also state, before proceeding further with the description of my own dissections, what were the actual results of the investigations of M. Bendz, so that I may not be suspected of laying claim to what he had previously described. Bendz described the spinal accessory as formed of two distinct sets of roots—one set, that usually described arising from the *medulla spinalis* and lower part of *medulla oblongata*—the other set of filaments he described as arising close to the lower filaments of the vagus joining the first mentioned set of nervous fibres within the cranium, and afterwards forming the internal root of the accessory,* which joins the *par vagum* a little below its upper ganglion. He states that this internal root, after sending a few filaments to the second ganglion of the vagus, can be traced distinct from the other portion of the vagus trunk along its whole course in the neck, until it enters the chest, where these filaments seem to be lost in the recurrent laryngeal nerve and the œsophageal and cardiac plexus. In speaking of the fibres of the accessory which arise close to those of the vagus, he says, "Proxime posteriorem radicis nervi vagi marginem radiculae nervi accessorii Willisii incipiunt, quae ad formam et tractum a fibris radicis nervi vagi valde differunt." I have been able in all my dissections to confirm the statements of Bendz, except as regards this difference in appearance and course between the upper filaments or roots of the accessory and those of the vagus. In the representation accompanying his thesis they certainly appear very different, but in my own dissections they have always seemed both to myself, and others who examined them, so exactly to resemble the roots of the vagus both in situation and appearance, as to incline me to describe them as fibres of that nerve passing to join the spinal accessory before it leaves the cranium, and this is well shown in the accompanying plate. Having now given an account of the principal points discovered by Bendz, I shall very briefly describe the anatomy of the vagus and spinal accessory, as regards the points in question, from my own dissections, particularly that from which the accompanying plates was taken, and which is preserved in the Anatomical Museum of this University.

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* These seem to be the same fibres which I mentioned as appearing to pass from the vagus to the roots of the accessory within the cranium.

When a section of the cranium and spine similar to that represented in the plate has been made, and the posterior roots of the spinal nerves divided near their ganglia and reflected, the spinal origins of the accessory can be readily traced, commencing generally about the root of the fifth cervical nerve, and gradually forming a flattened cord which ascends into the cranium through the *foramen magnum.* It is there joined by some fibres from the lower part of the *medulla oblongata*; there then intervenes a small space from which no filaments arise; but higher up again, and close to, or I should rather say from, the filaments forming the vagus, there pass back two or three filaments which join the accessory at an acute angle just as it is leaving the cranium.

Almost immediately after passing out of the cranium, the accessory divides into an external and internal portion. The external, after communicating with the spinal nerves and sympathetic, passes through the sterno-mastoid, to which it sends branches, and is finally distributed to the Trapezius. The internal root of the accessory, which seems principally formed by those filaments which arise beside the origin of the vagus, joins that nerve a little below its superior ganglion. If we carefully remove the neurilema from the vagus at the point where this junction takes place, a small flat white nervous filament is seen to pass down to the internal root of the accessory. This filament I have in all my dissections been able to trace up over the superior ganglion of the vagus into the groove between the olivary and restiform bodies. Retracing it downwards to the point where it is joined by the internal root of the accessory, these two filaments will be found to coalesce and form a white nervous cord, the pharyngeal branch of the vagus being given off from the point of junction of the two filaments. The white nervous cord so formed can be traced down over the inferior ganglion of the vagus to which it sends * one or two delicate filaments. It then continues to descend parallel to, and within the same neurilemal sheath as the grayish or ganglionic part of the vagus to the lower part of the neck, where, after receiving fibres from the ganglionic portion of that nerve, it seems to pass principally into the formation of the recurrent laryngeal; some filaments, however, still continuing to pass down with the trunk of the vagus into the chest, but these I have not yet been able to trace to their final destination. To this white nervous cord I would be inclined to give the title of the motor column of the vagus, as from it seemingly the motor branches of that nerve arise, for whilst we can distinctly show that the pharyngeal and inferior laryngeal do so, it may also be presumed that the œsophageal filaments might also be traced to the same origin. Indeed, the dissections of M. Bendz already quoted seem to bear me out in this supposition; for he states that he has traced fibres of the internal root of the accessory along the vagus into the œsophageal plexus, as formerly mentioned.

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* These filaments appear as if passing towards the superior laryngeal nerve, which arise from this part of the vagus; but I have never been able to trace them fairly into it.

From these anatomical details, I think it may be concluded that the *par vagum*, like the third division of the fifth pair, is composed both of motor and sensitive filaments; that its motor column, as I have termed it, is formed partly by intrinsic non-ganglionic fibres, and partly by filaments from the internal root of the spinal accessory. This anatomical disposition of the vagus would perfectly account for all the phenomena witnessed in the experiments referred to at the commencement of this paper; and makes good my assertion, that the results of the experiments of Dr Reid and M. Longet, as to the effects produced by irritating the origins of the vagus and accessory within the cranium, are not so contradictory as they might at first appear to be. For that effect, which forms the positive portion of the experiments of each, (viz. the movements produced in the laryngeal muscles by irritating the vagus, in Dr Reid's experiments, and similar motions resulting from irritating the accessory in those of M. Longet,) is fully borne out by the anatomy, whilst the mere absence of the effect, or what may be termed the negative part of these experiments, which gives rise to the apparent contradiction, might, and doubtless did depend on other casual circumstances, such as the exhausted state of the muscular contractility and irritability, owing to the time required to perform the preliminary steps of the experiment; and of such sources of fallacy Dr Reid, at least, seems well aware; for when speaking of the absence of contractions of the laryngeal muscles on irritating the origins of the accessory, in reference to these very experiments, he says, "We certainly do not consider that these experiments entitle us to assert that they are not motor filaments." I cannot conclude these remarks without acknowledging the obligations I am under to Dr Allen Thomson, for the great interest he has taken in the dissections of which I have been detailing the results.

Explanation of Plate VI.

Fig. 1. Optic nerve.
Fig. 2. Third nerve.
Fig. 3. Fourth nerve.
Fig. 4. Fifth nerve.

Fig. 5. Sixth nerve.
Fig. 6. *Portio dura* of seventh nerve.
Fig. 7. *Portio mollis.*
Fig. 8. Glosso-pharyngeal of eighth pair.
Fig. 9. *Par vagum.*
Fig. 10. The filament of the vagus which passes over its superior ganglion.
Fig. 11. The filaments described by Bendz as the superior origins of the spinal accessory, and which form its internal root.
Fig. 12. Spinal portion of the accessory.
Fig. 13. Motor column of the vagus formed by the junction of its non-ganglionic filaments (10), with the internal root of the spinal accessory. This nervous cord, after giving off the pharyngeal branch (14), is seen descending over the second ganglion of the vagus, and along its trunk into the recurrent laryngeal, (15.)
Fig. 16. Continuation of the *par vagum.*

ART. VIII.—*Some Remarks upon a more extensive employment of Sulphate of Zinc in certain flatulent affections of the Bowels, but especially of the Colon, and in the Cure of Constipation.* By GEORGE STRONG, M.D.

"Des diverses parties du tube digestif, le colon est celle òu les gaz s'accumulent le plus souvent d'une maniere morbide."—ANDRAL, *Prec. d'Anat. Path.*

THE following sentence from a writer of the first Christian century, Clemens Romanus, shows that flatulency was in early times considered to be one of the forms of possession: "Crepitus ventris pro numinibus habendos esse docuere." In our own day, when the development of gases in the *primæ viæ* is not sufficiently urgent to arrest the attention of the practitioner as meriting the name of tympanites or colic, it is apt to be entirely passed over, or is loosely regarded as one of the symptoms of deranged bowels, or as an occasional attendant upon dyspepsia. In the milder forms, its unostentatious nature, great frequency, many sources of origin, and the habit of being a concomitant of other maladies, account for its disparate position in the nosology, that is to say, how this affection or symptom has come to be differently classified by nearly every writer who has alluded to it.

"Wind in the bowels" is a designation as correct as the idea of it is generally vague and disregarded; for, as will appear in the sequel, wind does not often lodge in the *stomach* in great quantity, and for a length of time. There are a certain number of dyspeptics in whom the stomach is perfectly healthy, (for a sympathetic disturbance is not disease), notwithstanding a feeling of oppression, of craving, or of sinking in the præcordial region, with tenderness to the touch. There may be rumination or a regurgitation of food soon after it is swallowed, a rising up in the mouth of pure water, and even occasional vomiting, thirst, or falling off in the morning appetite, with a furred or coated tongue. If with all or any of these symptoms there co-exist a slight tympanitic state of the abdomen, and gross errors of diet be excluded, a favourable case is presented for the trial of astringent remedies in a condition, which has, I suspect, been occasionally thrust out of view by the expressive phrase, " morbid sensibility of the stomach and bowels," or the gastro-enteritis of the French school. The symptomatic appearances of the tongue are to be received with caution; yet I have often observed a large flabby indented tongue, an hyperæmiated tongue, to accompany this train of symptoms, hinting, as it were, the existence of a similar state of hyperæmia in some lower part of the alimentary canal.

Dr T. J. Todd, in an able and comprehensive article on Indigestion, has described the enlarged calibre and tympanitic distension of the great intestines as a species under it, by the name atonic colonic dyspepsia. Other writers have alluded to the same condition when treating of colic; " a variety of this disease called flatulent colic is very common in dyspeptic persons, more particularly in those who are ill nourished, or who are addicted to the use of spirits."—(Whiting.) Dr Copland, too, has given an invaluable account of flatulency of the intestines, idiopathic and symptomatic.

This meteoric affection is often attended with cramps in the calves of the legs, and with cold feet, preventing sleep at night. In a pronounced form it indicates itself not only by tremor, but often to the feelings of the sufferer: his breath is short, especially on climbing a stair, and his heart flutters; the bowels are often slow. On percussion, the abdomen yields a clear tympanitic sound: the swelling increases after a meal, when the uneasiness becomes distressing, the patient looses surrounding garments, walks about, lies down first on this side, then on that, rises again, making efforts to expel the wind which torments him. This form might probably take its place under Mason Good's " cholera flatulenta."

In these numerous and mild cases the exacerbations are brief and transient, terminating after two or three hours; but they recur on the repetition of the provocative, and occasionally persist in a less degree for many weeks. The alvine evacuations are irregular in quality, in quantity, in periodicity, and in consistence, and with an uncertainty, that forbids our deducing any indication.

Dr M. Hall's account of the borborygmus or stridulous movement of flatus as it shifts from one part to another, is amusing; but the symptom cannot be considered characteristic, and was indeed wanting in many of the cases that yielded to my mode of treatment: " This noise is very much under the influence of respiration, and also of any state of excitement." "For the most part, and especially on inspiration, it is somewhat less so, conveying the idea of the sound issuing as it were from water. Often before it ceases, it resembles the plaintive sound of a dying animal."

Distension of the cæcum and ascending portion of the colon is said to occur not unfrequently in those who wear a tight cincture around the body, and indeed the croaking and stridulous noises are common in young persons. Disorder of this portion of the bowel induces now and then frequent desire of nutrition, with retraction and numbness of the testicle, sometimes even exciting an access of varicocele, sometimes tenesmus. The symptoms dependent upon a relaxed and distended condition of the descending colon and sigmoid flexure are not dissimilar ; but it is when the arch of the colon is thus affected, that the symptoms arise which often excite alarm, especially in the young practitioner, for the heart, as was remarked one hundred years ago by Whytt: "When my stomach and bowels have been out of order and affected with any uneasy sensation from wind, I have not only been sensible of a general debility and flatness of spirits, but the unexpected opening of a door, or any such trifling unforeseen accident, has instantly occasioned a sensation about my heart, extending itself from thence to my head and arms, and in a less degree to the inferior parts of my body." Sometimes in addition to palpitation, there is shortness of breath on exertion, and a livid colouring of the lips and cheek, with a dry cough, while the hot skin and accelerated pulse of an evening exacerbation help the delusion. The more advanced student perhaps chuckles over his supposed discovery, that the stomach is the organ in fault; but we may often go a step beyond and explain this and some other simulated diseases by the contiguity of a disordered colon. Such, at least, seems the best explanation of the benefit derived in these cases from a well-timed course of purgatives, or of the almost sudden cure of an inveterate dyspepsy by the administration of powerful astringents.

The stomach always contains as well as generates a certain amount of air; but it is an error in the history of dyspepsia to imagine that this viscus is frequently the seat of flatulence. No doubt, in the complaint of cattle called Houen, which commonly arises from over-greedily feeding upon succulent green meat, it is useful to retain a flexible tube in the gullet and stomach for a considerable time, in order to afford a vent for the successive extrication of air. In France, and in some parts of this country, it is the custom to puncture the paunch of sheep with a trocar, that the wind may freely escape. But in the human stomach such complaints and such remedial means are scarcely known.

If an inconvenient quantity of air be generated on any occasion, eructation of the excess soon takes place, or it passes off by the pylorus, or is absorbed, so that a permanent distension of the stomach from wind is by no means a common occurrence; though indeed other substances, animal, vegetable, and mineral, both solid and fluid, have been known to lodge in the stomach for an almost incredible length of time, and at last to be discharged by vomiting. Where there exists flatulency of the stomach, that is, an extrication, not a retention of air, the patient generally hastens his relief by taking brandy, peppermint, &c.

As in the material world disasters of fire and flood are the outbreak and irregular operation of very beneficial powers, so diseases and disorders of our organs are traceable to a redundant or to a deficient performance of their individual functions, rather than to an aberration from their ordained course.

The chief function of the colon is delay. It might therefore *a priori* have been expected that, of all the intestines, the colon would most frequently become over-distended with gaseous and other matters, inasmuch as its natural office is that of a reservoir for such matters; and the presumption is ratified by the fact. Not to travel out of the way in search of an illustration, we may remark that, notwithstanding the duodenum can scarcely be said to receive an investment from the peritoneum, nor are the small intestines strengthened with longitudinal muscular bands, nevertheless these tubes in their weakness, much more rarely than the colon, undergo distension, for they are in this sense tubes of transit only, not of capacity, So again affections of the œsophagus are incomparably more rare than those of the stomach, consisting, not in a congestion of blood-vessels or the opposite of this anæmia; not in a lesion of secretion, excess, deficiency, or derangement; but far more generally in accordance with the principle just enunciated, in an impediment to the act of deglutition; almost the only act which the gullet has to perform.

The large intestines serve at once the purpose of a temporary reservoir and of a cess-pool. The nourishment triturated in the mouth passes hastily through the fauces, and down the œsophagus, but in the stomach is retarded an hour or two before its passport for the pylorus can be got ready. The onward progress now, though tortuous, is uninterrupted through the duodenum, and along the jejunum and ileum, till the dregs, solid, fluid, and aeriform are emptied into the great receptaculum. Κωλον quasi κοιλος, signifies hollow; and indeed whatever vapours or gases enter, probably at once pervade its entire cavity. Their labours ended, the organs of supply now enjoy their repose. Not so the colon; it has had prisoners of varied characters, often of unruly disposition given in charge; it contents are precluded from either egress or regress for a period often exceeding twenty hours; during which an unceasing struggle is necessary on the part of the visceral muscles to maintain the healthy calibre of the bowel; a peculiar but well-known arrangement of the mucous membrane of the muscular fibres, and of the serous covering, favouring much variation of capacity.

The heart never intermitting its function, has been calculated to sleep or to be in a state of repose during one-third part of its existence, that is to say, during eight hours out of twenty-four; and this proportion seems necessary to its well-being, as well as to that of the entire frame. Similar periods, too, of repose and of activity appear to be allotted to the muscles of respiration. But the colon is frequently tasked to exertion in a much higher ratio, and, unlike the heart, mostly yields to the pressure from within, and suffers dilatation.

Cullen states in general terms, that " the flatulent symptoms are to be referred to the loss of tone in the muscular fibres of the intestines, rather than to any fault in the digestive fluids." Yet it is obvious that loss of tone in this case would not occur but for the expansive pressure of the digestive fluids and gases, an antagonistic force that ought to go into the account; for how common is it where obstruction exists about the ileo-cæcal valve, or in the case of artificial anus, to find the diseased portion of the bowel firmly contracted upon itself, indeed more resembling a small cord than a canal? But what pathologist explains the phenomenon by an excess of tonicity?

The question is still undetermined as to the sources of tympanites; I will not, therefore, mention the enormous volumes of gas discharged during a paroxysm of hysteria, except as a striking instance of the mucous membrane secreting air; hence flatulency may in some cases be looked upon, saving the solecism, as a dropsy or as a gleety discharge, dependent like ascites or chronic bronchitis, not alone upon increased secretion, but upon a relaxed state of the capillaries, and a want of local nervous energy for the purpose of absorption.

This relaxed condition of a lubricating membrane and atony of the subjacent muscles are almost as often co-existent as the two tissues are contiguous. The peculiar smoothness of the side in empyema has been long described as a pathognomonic sign of that disease; it proceeds, as every one knows, from a yielding of the intercostal muscles, so that the spaces become obliterated: but Dr Stokes of Dublin has shown, that the phenomena are inexplicable by the formerly received doctrine of simple pressure from within: and that a loss of tone, a paralysis of the fibres, was necessary before they yielded to pressure. On the other hand, in *colica pictonum*, paralysis of portions of the muscular bands would not cause such an accumulation of gas from retention alone; there must either be an increased secretion or a deficient absorption charged against the capillaries of the mucous membrane. Excluding, therefore, permanent chronic dilatation of the colon, which, like that of other hollow organs, *e.g.*, the heart, stomach, bladder, is caused by some mechanical obstruction to the exit of their natural contents; we may adopt the following physiological axiom: That the stomach and the whole tract of the alimentary canal always contain a certain quantity of air or gaseous fluid, and that this quantity is great in proportion to the deficiency of their vital energy.

Before proceeding to speak of astringents and of sulphate of zinc in particular, I will venture to quote from a recent work so much of the modern doctrine of inflammation as is immediately connected with my subject. Because, whatever may be the ultimate fate of this theory, (and the world has now seen many theories in explanation of "that most important, most common, and but imperfectly understood deviation from the healthy state,") the passage may serve to shed a stronger light upon the view I am now presenting to the reader.

"The action of the arteries is acknowledged to be contraction, whether muscular or not: and a consideration of the phenomena of inflammation and of the nature of arterial action will show, that in inflamed parts the capillary arteries are weaker in their action; that there is diminished arterial action, for the action of arteries is contraction: now the arteries in inflamed parts are evidently larger than before—less contracted, that is, acting less. An inflamed part is redder and swelled; where the vessels are visible, as in the eye, we can see that the redness is caused by the minute vessels becoming larger, so as to admit more red globules of the blood, which before admitted chiefly the more fluid and transparent part. This enlargement of vessels is not from increased action, but, on the contrary, from their action being diminished, their giving way and being dilated by the injecting force of the heart. The way to diminish the inflammation is by increasing the action of the arteries, as by cold or astringents, which make the arteries contract, that is, increase their action. So that far from the arteries is an inflamed state, being in a state of increased action, one of the means of diminishing inflammation is by increasing arterial action in the part inflamed." (Billing.)

After Dr Percival's successful administration of alum in *colica pictonum*, Dr Moseley introduced and recommended sulphate of zinc, but whether upon chemical principles, or with a view to an astringent or any other effect, is still a questionable matter. Its astringent virtues, however, remain unquestioned, and though the disagreeable metallic taste which zinc leaves upon the palate is objectionable in gargles, yet, in the cure of various discharges, as from the urethra, &c. or in leucorrhœa, this preparation of zinc is in high estimation, and in daily use.

In administering this salt in what I judge to be an affection of the bowels, not of the stomach, it is proposed,

1. By renewing the tone of the muscular fibres to control the calibre of disordered portions of the tube.
2. To cure constipation where purgatives could not be borne.
3. To constringe the mucous capillaries, and thus to diminish the secretion of gas, or to quicken its absorption.

One of the happiest and most imposing improvements of modern medicine is the cure of congestions commonly called inflammations, by the local and direct application of stimulants. Periosteal nodes are relieved by blisters; hematemesis by swallowing oil of turpentine; an ulcerated cornea yields to *Vinum Opii*; and lunar caustic exerts a powerfully controlling influence over *erysipelas errans*. Ergot of rye seems capable of exerting an influence not only upon the muscular structure of the womb at the epoch of parturition, or when charged with other products, and upon its capillary vessels in ordinary circumstances of hemorrhage, but, when administered for a certain length of time, of causing contraction and coagulation of the very fibrine of the blood in the large arteries of the body. Other cases of indirect specific action may be glanced at, such as hepatized lung yielding readily to large doses of *Oleum Terebinthinæ*; and could this powerful agent be always brought to bear upon the pulmonary organs, it would be as invaluable in their congestions as the tincture of cantharides is become in certain forms of leucorrhœa.*

All these specific stimulants or astringents, (for such is their effect,) be they direct or indirect, act primarily and perhaps solely upon the local nerves, which are first impressed with pain, then excited into energy, and thus cause contraction in all tissues within their province that obey nervous influence, but they cause especially contraction of enlarged capillaries. In deafness owing to a relaxed and engorged state of the mucous lining of the Eustachian tube, a gargle of alum produces retraction of the swollen mucous tissue, *i. e.* of its vessels, after which, on blowing the nose forcibly, air is found to penetrate into the cavity of the tympanum.

In connection with this subject, may be mentioned from M. Parent-Duchatelet's work called "de la Prostitution dans la Ville de Paris," his remarkable instance of a woman aged 51, who had been upon the town since she was 15, and upon examination at the prison of the Madelonettes in Paris, the sexual organs presented, he says, the appearance of those of a maiden just turned eighteen years of age. This female acknowledged that she constantly used astringent washes.

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* Is the author quite serious in believing that oil of turpentine is capable of resolving a hepatized lung, and restoring the natural structure?—EDITOR.

These are illustrations of the meaning of the word *astringent*, or of the sense in which only a drug can be said to *astringe*. It is a coarse but not an uncommon interpretation of the word to understand that it confines the bowels. Now, if sordes or small collections of fæcal matters lodge up and down the digestive tube, this may depend upon a simple diminution of organic sensibility, the nerves of the mucous membrane are blunted in their delicacy of tact. In the case of a larger accumulation, there may be also a want of power to propel forward the mass. Where pouches form and become distended with gas, there is an interruption of the regular peristaltic motion of the intestines. These are the chief elements of functional constipation.

The internal employment, then, of similar astringents is in entire accordance with the present state of our knowledge of contractile tissues, and, indeed, I suppose, the salts of zinc and of copper are now pretty generally administered in this country for the cure of common attacks of diarrhœa, as well as of the passive flux into which dysentery sometimes degenerates; coaxing the stomach, by combination of a little opium, to permit their undisturbed passage through it.

If the tissue of our hollow organs obeys the same laws that regulate our external and visible parts, and medicine will take a hint from surgery, perhaps it may not be presumptuous to anticipate the substitution ere long of prompt astringents, for the tedious formula of tonics, in certain cases of dyspepsia, in many of flatulence and mild colic, and to alternate, at least, with laxatives in the cure of habitual constipation unconnected with organic obstruction.

The expressions "direct application or immediate application of astringents and stimulants," comprize the idea of the short reflex circuit which is excited in every styptic process; and such application is understood to be direct in comparison of the very distant influence which tonics exert. All contraction is excited through the nerves. The two contractile tissues now recognized by physiologists are capillary arteries and muscular fibre. Now when the nerves of the mucous membrane are impinged by the salt, the proximity of these two tissues in the mucous and muscular coats of the bowels, involves the inclusion of both within the smallest reflex circuit that an astringent stimulant could excite, consequently, in nearly all conditions both of health and disease, these tunics sympathize.

I will not dispute the general accuracy of Dr A. T. Thomson's assertion respecting the action of astringents upon the digestive organs.* "The mucous membrane of the alimentary canal," says he, "becomes comparatively dry, from its usual exhalations being diminished, and costiveness is the result." But I think the paragraph is one calculated to raise prejudices against a most useful class of remedies. Far from the above effects resulting, I remark that the administration of these remedies, according to my plan, is followed by a considerable production of flatus, and often by its discharge through the œsophagus as well as downwards; but in the course of a day or two, the patient who was used to loosen the waist band a few hours after a meal, now declares that "his body is certainly less, and that his wind is better for walking or mounting a stair;" there is in medical language more room for the play of the diaphragm. Soon regular, large, seldom loose evacuations make their appearance, consecutive to a peculiar sensation in the abdomen, not amounting to griping. There is occasionally a tingling like the pricking of pins and needles, felt over the trunk and even along the extremities for a short time, that cannot fail to suggest the dietetic origin of some forms of prurigo or of urticaria. In some instances where sluggishness pervaded the *primæ viæ* half an ounce of castor-oil appeared to diffuse the astringent salt throughout the colon, and presently to bring on its contraction.

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* Elements of Materia Medica and Therapeutics.

It is preferable to prescribe sulphate of zinc in the form of pill, both to avoid the disagreeable taste, and on account of the tendency of this preparation, even in small quantities, to cause nausea. What Dr Elliotson recommends for sulphate of copper, viz. to give it immediately upon a meal to prevent nausea, is applicable to sulphate of zinc, and where this precaution is not sufficient, I have found the addition of opium enable the stomach to bear the full dose, with the single disadvantage of occasionally inducing thirst. Thus,

℞. *Zinc. Sulph.* gr. xviii.; *Pulv. Opii* gr. iii. *mucilaginis q. suff. m. ft. pil.* vi. *cap. un. quintâ quâq. hor. post cib.*

Where the stomach could dispense with opium, I have directed a pill to be made up with one grain of extract of rhubarb or of gentian, to three of sulphate of zinc, and taken four or five times in the twenty-four hours. It is a main object of this plan to throw at once a strong solution into the cæcum and large intestines, and, since small doses only can be passed through the stomach, they must be made to succeed each other rapidly. Occasionally after fifteen or twenty grains have been taken, there is intolerance of a further dose, and vomiting occurs even when the medicine is qualified with opium.

This occurrence I have generally found to be a criterion that the colon had resumed its healthy calibre; but it should be added, that vomiting or the excitement even of nausea are by no means essential to the entire success of the treatment.

Regarding this practice as a kind of stimulating lotion to a relaxed part, we cannot consider twenty grains but as a small quantity of sulphate of zinc, to be applied to the enormous surface presented by the colon; the mere length of which, not to mention its breadth when cut open, exceeds seven English feet in an ordinary sized man.*

To proportion the remedy with confidence to the extent of the derangement, to its previous duration, to its intensity, also taking into account age, sex, temperament, mode of life, state of health, climate, season, &c., requires obviously discretion and experience; but it may be worth while to note down in this place, that an under dose, an inadequate stimulant, is apt to tease the weakened part, an effect which is commonly expressed by the phrase, "tonics are not well borne." It has never in my hands produced disagreeable effects, cumulative or otherwise, though I have boldly used it for a considerable time past.

Dr James Johnson, in 1826, published some useful observations upon the employment of nitrate of silver in a condition of the digestive organs called "morbid sensibility of the stomach and bowels;" a condition perhaps nearly akin to what has been already pointed out. But, however powerful the tonic influence of this remedy upon the alimentary canal on the system at large, between chemical decomposition and absorption, very little of it in substance can ever reach the colon. We reject sugar of lead, another metallic astringent, from its generally noxious influence upon this viscus. Alum is objectionable, chiefly on account of its bulk, a scruple being no more than equivalent to three grains of white vitriol; add to these sulphate of copper, and we have three astringents, which in certain doses seem to be repelled by the absorbents of the stomach and upper bowels. There is reason to suppose that they pass undiminished in quantity out by the pyloric opening, then mix intimately with the chymous, and successively with the chylous mass in the duodenum and ileum, the solution becoming more and more concentrated and astringent, in proportion as the absorption of nutritious particles proceeds, and as the drug approaches the part where its services are required. The circumstances and progress are not dissimilar to those of a dose of purgative salts.

The durability of the impression thus made upon the bowel is a question of some interest in comparing the effects and weighing the respective merits of astringent and of purgative medicines. Three weeks is the shortest period within which I have known the flatulence and costiveness of the bowels return after their disappearance under the use of zinc, and in these instances the astringent plan has been resumed upon a broader footing.

The remedies that have of late been proposed, such as the employment of the galvanic circuit, the hot or cold douche thrown upon the abdomen, and bladders of ice or snow laid over the part, are at once seen to be of restricted applicability; few persons being willing to incur the expense and loss of time, and to undergo the severity and inconvenience of these heroic remedies for an ailment comparatively trifling.

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* La longueur totale des gros intestin est d'environ sept pieds dans un homme de moyenne stature. Cloquet, Anat. Tome ii.

The nearest approach to this principle of treatment that has yet come under my notice, is that of Dr Warren of Taunton, who recommended "alum whey, where atonic colonic dyspepsia existed, in conjunction with gentian, tonics," &c. The routine treatment in this country is still but too often a random shooting of arrows in the dark; little diagnosis being made of this class of maladies. Alteratives, counter-irritants, an occasional purge, then a course of mild tonics and aromatic bitters, with a regulated diet and daily foot exercise, will cure this form of dyspepsia in five or six weeks. Such was the method of the late Dr Baillie.* Various disorders may no doubt be recovered from by pursuing this plan, which is excellent, but, where an erroneous view of the case has been unfortunately taken, involves a serious loss of time.

In a valuable work professedly upon "the Stomach in its morbid States," by Mr Langston Parker, some cases and symptoms which are detailed actually tend to show that the *bowels* were in fault, not the *stomach*. Thus chapter 13 is entitled, "of the treatment of those forms of stomach disease whose prominent symptoms are pain and constipation." And amongst the drugs prescribed for this stomachic affection, and which completely relieved it, may be picked out, rhubarb, cascarilla, *Magn. Sulph.* and *Tinct. Alöes*;—making good, it would appear, that pleasant satire upon our art, that sagacious physicians in all ages have exhibited considerable agreement in the article of treatment, however their theories might be at variance and frequently in direct opposition.

ART. IX.—*Remarks on the Physiology and Pathological bearings of the Skin and Mucous Membrane.* By WILLIAM EWART, Esq., Surgeon, Alston, Penrith, Cumberland.

THE skin and mucous membrane form one continuous structure, enveloping the body externally, and lining all the internal passages or cavities that open on the surface. Their endowments are various and important, and beautifully adapted to the situations they possess. The skin being constantly in contact with exterior matters, and exposed to all the accidental rubs and impulses every where contingent, has a sensibility in admirable accordance. Keen and exquisite in itself, it is mellowed down and suited to the circumstances in which it is placed by a covering of obdurate cuticle. In the same way the mucous surfaces are every where adapted to the impressions of the matters that pass along them—their welfare as organs of sensation being protected by the mucus which they secrete. But these structures are not only important in the human economy, as the recipients of impression and the seats of sensation, forming often the incitement to voluntary or instinctive action, for they are apparently, at the same time, to a considerable degree, engaged as organs of excretion. In this aspect alone is it here intended cursorily to view them.

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* Posthumous Writings.

One of the fundamental conditions, if not the fundamental condition, of organization consists of a continued renewal of the particles which compose it. This may be considered a sort of axiomatic physiological truth at once arrived at on the simplest consideration. The body is continually deriving fresh accessions of matter from without, and as it is evident that its increase of weight does not go on in proportion, it is plain that something must as constantly be separated from it. Every organized part is supplied with blood, and from this is derived, through the instrumentality of vital attraction, a certain normal material constitution. And in every organ of the body this constitution is the subject of continual dissolution;—nutrition, properly so called, consisting of this in co-existence with constant recomposition. The products of this structural decay entering the circulation are eliminated from the body through the medium of certain organs, seemingly in the form of definite compounds. The organs subservient to this purpose are the kidneys, lungs, skin, mucous membrane, and perhaps the liver. Other glands opening on the mucous membrane may haply in some degree perform the same office, but if they do their functional operation in this respect is not so apparent.

The proper ultimate elements of animal structure are these four, carbon, oxygen, hydrogen, and nitrogen. They certainly are in many structures in combination with other matters, such as the simple inflammables, sulphur and phosphorus, and several alkalies or earths; yet still they may be considered as the true elementary principles of organized matter. These form likewise the component elements of those products of structural decomposition separated from the body by the excretory organs already mentioned. The animal excretions are evolved from their appropriate organs in combination with a greater or less quantity of water. This may be partly derived from the dissolution of matter previously assimilated, and may partly consist of water absorbed into the circulation, and passing off unassimilated as other extraneous matters do.

Experiments have been performed for the purpose of ascertaining the loss of weight which the body sustains from the amount of pulmonary and cutaneous excretion in a given time. Thus, according to Lavoisier and Seguin, 453 may be considered as the average for a period of twenty-four hours, and that 303 of this may be assigned to the excretory action of the skin, and 153 to that of the lungs. If the conclusions of experimentalists be, however, correct, the loss of weight appearing to result from pulmonary exhalation can only be the mere excess of this over-absorption. For " the whole average quantity of carbonic acid given off in twenty-four hours by the respiration of an ordinary sized man appears to be about 40,000 cubic inches, which weigh nearly three pounds, and contain about 113 of carbon, while the quantity of water exhaled from the lungs in twenty-four hours has been estimated by Dr Thomson at 193, and by Mr Dalton at 24,"* showing, that, to justify the above conclusion of Lavoisier and Seguin, there must be a concomitant compensating absorption of some matter or other. Be this as it may, however, the continued excretion of carbon from the lungs is undisputed. At the same time, in a healthy human body, there is constantly separated from the skin an excretion either in the shape of sensible or insensible perspiration, which would appear to differ principally in the quantity of water they contain ; for, like the urine, the perspiration becomes attenuated as its quantity is increased. The excretion of the skin, besides a small quantity of the same alkaline and earthy salts as the serum of the blood, contains a considerable proportion of lactic acid and some muco-extractive, and in its separation from the body would seem to hold the same relation to health as the pulmonary excretion of carbon, that is necessary to the persistence of this state, while any continued defalcation from its normal existence will be productive of disease. The same may be said of the carbonaceous excretion of the liver and the azotiferous matters evolved from the urinary organs,—the appropriate elimination of the whole constituting an important element in the aggregate of actions that sustain health.

The healthy nutrition of organized structures, as it has been already observed, is established on the two principles of accession and separation of matter constant and coexisting. The eye of the physiologist has not as yet penetrated the dark and secret workings of nutrition ; he is, therefore, incapable of saying how or in what form matters are thus separated from structures, though he knows they must be separated, and at the same time entirely cast off from the body. Of the latter he has evidence in the operation of the various organs of excretion already mentioned, it being every way probable that the diminutions of these are the products of structural decomposition. Amongst these organs it is not unlikely that the skin holds an important station. Apart from the specific function carried on through the intervention of that of the lungs, the evidences are not so strong for the mucous membranes in health, having attached to them excretory functions of any great importance, yet they are constantly giving off portions of animalized excretion with the matters which pass along them; and in some cases of disease, as will be hereafter shown, they seem to be eliminators, vicariously or otherwise, in no slight degree.

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* Alison's Physiology.

A normal condition of the cutaneous circulation and consequent exhalation contributes much to the maintenance of health, as a perverted state of these functions is one of the most fertile sources of disease. Alternations of temperature, accompanied by hygrometric peculiarities, appear more frequently than ought else to give rise to changes in the state of the vital functions of the skin. A change from heat to cold, particularly if accompanied by moisture, directed upon the skin, constringes its structure, and produces from it a retrocession of blood and a retardation or stoppage of its secretion. Such an effect is even almost daily to be followed by temporary congestion, or this lapsing into inflammation of some other texture; and of all others the mucous membrane seems to be the texture most liable to this morbid superinduced state. Contiguity of structure and arterial distribution may perhaps at least form one cause in the determination of the locality of this latter effect. In a person previously healthy, for instance, if the exclusive exposure of the cervical region to an unwonted degree of humid cold is followed by any morbid consequence at all, this will be generally manifested in the shape of a common cold, consisting of inflammation, more or less, of the mucous membrane of the throat, and of the linings of the facial antra and sinuses. It may likewise be observed, that vascular irritation and inflammation of the intestinal mucous membrane would seem, when resulting from cold, as a morbid cause to be generally induced by this when applied to the skin of the lower parts of the body and limbs; and this probably in some degree from the same arterial distributive connection. It is common enough in some of the colder districts of Britain to behold the imperfectly clothed children of the poor affected through a whole winter by diarrhœa of various shades, from the stool of some consistence to the almost purely serous evacuation. In such cases the skin is dry and rough, and its excretory energies are deadened; and were it not that an exalted function of excretion is imposed upon the intestinal mucous membrane, probably vicarious to that of the skin, it is not unlikely that mischief of more serious import might ensue. Doubtless other causes besides contiguity and arterial distribution may often act in determining the site of inflammation produced by the application of cold to the skin, such as local predisposition, however produced, and though it is not impossible that the circumstances alluded to may have some effect, yet extensive and accurate observation would still be required to determine the law or laws by which cold acting on the skin excites inflammation of some other part. Besides the effect which cold has upon the vascular functions of the skin, it at the same time acts powerfully upon its sensibilities; and in this way, when at all energetic and continued, it displays a sedative operation on the heart. This, in conjunction with the concomitant suppression of that normal excretion seemingly necessary to, and constantly taking place during health, must likewise have its share in the causation of disease. Besides inflammations, continued fever is sometimes observed to result from the action of cold upon the skin, if hot, as an exclusive yet as a greatly assistant cause. In the production of such febrile phenomena, besides the derangement in the distribution of the blood, and the effect on the heart's action manifestly resulting from cold, it is probable that the suppression of the cutaneous excretion and its retention in the circulating fluid may be more engaged than is generally thought of. Established fever essentially consists in a subversion of those normal actions that take place in the whole capillary system of which we have as yet a very hazy conception, and which constitute the nutrition of structures and the excretion of matters, both excrementitious and recrementitious. In all fevers, whether idiopathic or sympathetic, this subversion is the essence—the *sine qua non*—however it may differ in kind or in the source whence it springs. Here the distinction of solidist and humoralist should be immediately and for ever flung to the winds, for by amalgamation alone can both parties arrive at truth. The proximate cause of fever can surely be neither this or that state of either the solids or fluids exclusively, but must consist of a perversion of the vital conditions of both, for these are so mutually dependent that by no possibility can one be injured, and the others left unharmed. The retention in the blood of the animalized excretion usually passing off by the skin must in some degree alter its normal constitution, and, by modifying the results of the vital attractions, constantly operating in the production of healthy life, it must concur with other circumstances in the development of fever.

The excretory functions are at all times during health relative in their state of action. They vary according to the mode of life, the diet made use of, and the state of both the primary and secondary assimilation. If by any means this relative adaptation is overturned, disease must either suddenly or slowly supervene. There are two diseases of specific nature, whose history, both as regards their symptoms and cure, would seem to connect them in their production with a subversion of this normal relation; these are rheumatism and gout. There is a certain diathesis in the persons of those who are afflicted with both, termed by some the acid, which would appear to result from the imperfect evolution of those matters from the system which are usually eliminated in the form of lithic or lactic acids. The application of cold and moisture to the skin is generally the exciting cause of rheumatism. Observation has as yet not been close enough to determine whether there may not be some peculiar functional states predisposing especially to the access of this complaint. It cannot, therefore, be pronounced, however probable it may be, that, previous to the application of its general exciting cause, there has been any inactivity in the separation from the circulating mass of the acid excretions either at the skin or elsewhere. This is certain, however, that a rheumatic attack is usually preceded by a powerful impression by cold upon the skin, such as in other cases might be instrumental in producing common local inflammation; and it seems probable that the difference of effect resulting from the same cause may be safely attributed to a difference of diathesis, that is, a difference of constitution of that fluid particularly, which is the pabulum of organization and all vital phenomena. Common inflammations may take place at any time in the normal diathesis of human constitution on exposure to efficient causes; but it may be doubted whether in such true rheumatic inflammation can in the same way arise. The phenomena of this disease would appear to ally it analogically, at least, with those where nature, as it were, performs abnormal excretions in non-excretings sites, thereby producing a cumulative disease, and indicating some fault either in the vital affinities themselves, or in the mass of fluids on which they act. Such diseases must, therefore, manifest malignancy or incurability proportionally to the degree of constitutional vitiation whence they spring. As instances of such disease may be mentioned, the carcinomatous and tuberculous, whose local manifestations may be considered of an excretory nature, for if they are by any means stayed in one spot, they will for the most part burst forth in another. It is by no means intended to generalize so extremely as to classify rheumatism with such malignant ailments as the aforesaid, farther than that, in the former as well as the latter, there may be some abnormal state of the blood having something to do in their development. That particular kind of inflammation of the fibrous tissues around joints constituting acute rheumatism, may be conceived to have its specialty derived from its being probably an effort of depuration, though an unsuccessful one; and this, too, will give rise to its metastatic character. The system can alone be properly freed by restoring integrity to that eliminatory function whose deviation from health is here assumed to be the first link in the chain of diseased action; and this function the history of rheumatism would proclaim to be that of the skin. As long as this is unaffected, the subsidence of disease in one neighbourhood will be immediately followed by its eruption in another. According to these views, the fundamental indication of cure in the treatment of rheumatism will be to rectify the fault in the excretory function of the skin, subservient to which, bleeding, laxatives, diaphoretics, and sudorifics are the most efficient agents, the first, by allaying general fever, (always incompatible with the healthy action of any organ), the latter by a more immediate action on the skin itself. This, the most approved practice of modern times, conforms exactly to the above views on the pathology of rheumatism; and no less does the plan of prevention generally and successfully recommended, namely, the adoption of that kind of covering for the skin best adapted not only for upholding its function, but likewise for rendering those exterior agencies, cold and moisture, most calculated to hurt it, less injurious. It was remarked by Gooch, in reference to puerperal fevers, that the effect of medicines formed an important part in the history of such diseases; and it may here be said that the operation of remedial measures is of no less importance in investigating the philosophy of all disease.

Gout has long been considered as resembling rheumatism much in generic characteristics. Its phenomena certainly appear to warrant its development being brought under the same category of causation. Peculiarly the scourge of the sedentary, whose bodily activity is disproportionately small, and whose doings in high living are, on the contrary, too great, it is evidently connected with a perversion of the excretory functions. In such cases the structural assimilation of aliment in the highest degree generous must require a corresponding degree of activity in the evolution of those animalized matters separated during that process, no less than of others which had never been assimilated. This, however, is precluded by those inactive habits that lead to gout. Muscular exercise, so necessary to sustain the activity of the excretions generally, and that of the skin particularly, is neglected, and as a consequence there is retained in the blood that matter which ought to have been thrown off in the shape of lithic or lactic acids. Indeed, there is palpable evidence of the blood being charged with the lithic acid, in the circumstance of the lithate of soda being separated from it during an attack of gout. Doubtless there may be some fault likewise in the chylopoietic functions, but a co-existing and most important element in the pathology of gout, as bearing upon its cure, would seem to be a subversion of the normal relations subsisting between the nutritive and excretory functions. And to remedy this is the first indication of cure. It would be premature to pronounce decidedly on the exact *modus operandi* of colchicum in removing gout; for as yet observation has been too limited, and particularly too much wanting in nicety, to determine with certainty. Some ascribe its curative effects to its purging qualities, while others imagine these to be altogether independent of any action on the excretions. To set this question at rest, the balance of the chemist with his analysis must be put in requisition for important alterations, both as to quantity and quality, may occur in the execretions, particularly in that of the skin, and yet elude the detection of cursory observation. The therapeutic agency of colchicum is certainly exerted on the mucous membrane of the intestines, the skin, and the kidneys. In large doses it purges most severely. In more moderate ones it gently stimulates the functions of the kidneys, the bowels, and the skin. And in this way, when aided by co-operative measures, it is not improbable that it cures gout,—rectifying that functional subversion assumed to be the principal circumstance in the formation of this disease. Temperance and exercise are the first and most effective means for the prevention of gout; and, as observed by Dr James Johnson, "when regular (not violent) exercise cannot or will not be taken, frictions are a kind of substitute,"—these, under such circumstances, are calculated to be powerfully auxiliary in promoting the cutaneous excretion.

Not only do the organs of excretion throw off from the body those matters intended to be eliminated by them during a normal state of bodily constitution, but they likewise separate from the blood any extraneous matter that may be present in it. Instances of this may be daily observed in the passing off of various kinds of salts by the kidneys, and of other matters by the skin and mucous membrane. As a palpable example of cutaneous excretion of this kind, may be mentioned that of sulphuretted hydrogen in a person daily taking small doses of the sulphate of magnesia, with sulphuric acid. The transpiration of the sulphurous gas is clearly proved in such a one by any silver coin or watch that may be carried close upon the skin becoming blackened. For some reason or reasons unknown, one substance is more readily excited by one organ than another, and amongst those which pass off by the same organ there is great diversity in the effect they produce upon its structure, some merely more or less inciting its circulation, while others more energetic produce active inflammation. This difference may be exemplified by the action of various doses of *Sp. Æther. Nitros.*, and of cantharides on the kidneys. In the same way various agents produce diversified effects upon the skin, as may be seen by observing the operation of some medicaments, and the poisons of the contagious exanthemata. Of the latter diseases, it may be observed, that it would seem not in opposition to truth, to say that the exanthema which forms their most prominent feature is merely the expression of an effect produced upon the skin by a certain poison, in consequence of its being there eliminated from the blood.

The whole sum of diseases that affect the human body may be divided into the contagious and non-contagious. The first, according to the ingenious and very probable view of Liebig, are produced by the application of some matter in a certain state of decomposition to the blood, to which it imparts its own condition of transformation; the reproduction of the contagion depending upon the blood containing not one element only, which is decomposed, but another likewise, similar in composition to the substance from which the contagion was originally produced. When these conditions exist not, the contagion is not reproduced, and consequently the disease is not contagious. There are three important epochs in the development of all contagious diseases, viz. the reception of the contagion into the system; its action there, and its excretion from the same. In a series of individuals all exposed to a certain contagion, such as that of typhus or variola, and all, therefore, receiving some portion or other into their systems, we do not always witness the same consequent result. In some, exposure to the contagious poison is followed by a certain train of morbid phenomena, aggregately forming a disease of its peculiar production; while in others no such effect is displayed; health sustaining its integrity. This difference of result may ensue from various causes, sometimes, perhaps, from the poison received by different persons being in different states or quantities, or probably more often from some difference in the states, constitutional and functional, of the systems forming the recipients. This is certain, that a sound standard of health, that is, a perfectly normal state of all the vital conditions, tends no less to oppose the action of any contagion, than any derangement of these more or less predisposes to its successful operation, by constituting a susceptibility. Such, in the shape of a generality, may be stated thus:—The contagious poison and the vital principle, or rather, as no such substantive thing has as yet been proved to exist, the aggregate of conditions of which life and health is the product, oppose each other, and, according as the one or other predominates in power, disease or no disease is the consequence.

When a contagion, that is a matter in a certain state of transformation is received into the system, one of two things must take place. When the vital conditions are in a state of integrity and health, consequently strong, the antagonizing power of the poison may be rendered null, and itself assimilated with the matter with which it is in contact, or thrown off by the organs of excretion, as an extraneous body. Here there is no disease; but when, from some cause or other, a systematic susceptibility exists, the same matter will impart its state of transformation to some corporeal constituents, preverting the vital conditions engendering disease. According to the reasoning of Liebig, there are some matters that impart their condition of transformation to certain constituents of the body, thereby producing disease; but the circumstances necessary for their reproduction not being present, the disease is not contagious. In such a case the process of transformation must either be completed within the body, and the products assimilated or excreted as such, or if there be in the course of such a disease excretions still in a transformative state, they possess not the property of communicating this to the constituents of a healthy body. But, on the other hand, when a matter in a condition of transformation imparts this to some component parts of the body, and during the process is itself reproduced and excreted from the body as such, that is, in its transitionary state, the disease it gives rise to must necessarily be contagious, for the same cause will produce similar effects on subjects the same in nature.

As instances of disease arising under the former circumstances may be considered such febrile disorders as are produced by certain putrid matters, such as that met with in the dissection of dead bodies; and some kinds of puerperal and typhoid fevers. The latter again comprize the whole host of well-defined contagious diseases. The phenomena of contagious diseases of the exanthemata, for instance, would appear to warrant, considering the following circumstances as constituting their essence, viz. a perversion of vital affinity and vascular contractility, giving rise to abnormal products, which, as necessary to convalescence, must be disposed of in the course of the disease, either by assimilation or excretion; very frequently there is sensible evidence of the latter operation. That period in the progress of the exanthemata previous to the appearance of the eruption may be conceived to be employed by the contagion in communicating its peculiar condition to certain constituents of the whole bodily structure, thereby unhinging the normal nutritive processes, and producing the varied trains of symptoms belonging to this stage, such as shivering, lassitude, headach, nausea, pain of back, &c. But sooner or later excretion of the morbid products begins, and it is wisely ordained that the skin particularly, and the mucous membrane in some degree, performs this office in most, if not all, contagious diseases. The skin, as we have already seen, acts an important part in health as an excreting organ, and its vital relations are such as to constitute it, of all other organs, by far the most safe eliminator of those morbid formations, the elimination of which is attended by inflammation of the texture, forming the site of such operation. In most of the contagious exanthemata, some part of the mucous membrane is inflamed, which is very probably produced in the same way as that of the skin, by the excretion there of a certain portion of the same morbid products which are principally separated from the body by the latter. Besides, there is not unfrequently an evident appearance of vicarious determination to the mucous membrane. In a late epidemic of rubeola, observed by the writer, there was smart diarrhœa in a great proportion of the cases; and in the worst of this sort the cutaneous exanthemata ran a very incomplete course; sometimes after a normal appearance fading away more rapidly than usual. In one case, after a cutaneous manifestation not to be mistaken, slight though it was, vanishing in a few hours, and followed by severe bronchitis, diarrhœa, and death. Viewing the eruption of the contagious exanthemata as inflammation produced by the excretion of morbid products, whose separation from the body is necessary for convalescence, we may deduce certain indications of medicinal interference in strict accordance. And such indications happen to be those, the fulfilment of which constitutes the practice most successfully had recourse to at the present day. The fundamental indication is to obtain a free and steady excretion of diseased products, subserviently to which the skin should be kept as near its state of soundness as possible When a too highly heated regimen is adopted in the treatment of the exanthemata the cutaneous inflammation is much increased, thereby decreasing the power of the skin as an excreting organ, and promoting the severity of general fever. On the other hand, when, from imprudent exposure to cold, or other causes, the eruption is repelled, the excretion from the skin being repressed, there will certainly be lighted up inflammation in some other part, most commonly in the mucous membrane, but not unfrequently in the parenchyma of some of the viscera. Such incidental inflammations commonly constitute the most dangerous complication of the exanthemata. They will be best obviated by sustaining a proper action at the excreting surfaces, and even when developed the common treatment of inflammation, which is now necessary, will partly produce its good effects by promoting this. These circumstances connect the contagious exanthemata by a beautiful analogy with the phenomena of rheumatism.

Much and attentive observation would yet be requisite to ascertain the exact amount of action performed by the skin and mucous membrane in separating from the system the *materies morbi*, not only in the exanthemata, but likewise in all other contagious diseases. The eruptions of the former, both cutaneous and mucous, sensibly denote an important functional operation in the structures where they appear. Observation has of late years detected an eruption in contagious typhus, inducing some eminent physicians to class it with the exanthemata. The poison producing this disease is no doubt specific in its nature, and will, just as that of variola or scarlatina, produce its own peculiar effects upon the system, and the organs which excrete it. It is impossible to say how the various diseased products of the several exanthemata should each produce upon the skin an inflammation in sensible characters peculiar to itself. Thus in one we have a pustular, and in another a diffuse erythematous inflammation. The poison of typhus is seemingly such as to have little or no effect in exciting inflammation of the skin, though it may in some degree. May not the gastro-enteritis of this disease, so prominently brought forward as its cause by Broussais and his followers, hold the same relative position in regard to it that the inflammations of other portions of mucous membrane do to scarlatina, rubeoli, or small-pox? that is, not a cause, but an effect brought about by the natural excretory tendencies of the system existing both in health and disease, in the former throwing off the normal produce of the healthy dissolution of healthy structure, in the latter, on the other hand, separating contagious or, it may be, other matters equally the result of a perverted state of the vital conditions of the whole bodily constitution. The gastro-enteritis in typhus, it is likely, will vary in degree, appear even or not appear subserviently to the influence of several circumstances, such as the severity of the disease, the natural or acquired susceptibility of the gastro-enteric mucous membrane, and perhaps, likewise, on the co-existing state of the skin. To those who have sufficient opportunities, it might be no less useful than interesting to direct minute attention to the effects upon each and all of those structures, the part or whole of whose office is to throw off from the body the whole excretions, normal or abnormal, arising from the relative state of their functional operation.

The disease inflammation, which, for an evident reason, can never be a general one, but which, nevertheless, so frequently acts an important part in affections of the general system, is at once seen to be subject to a principle of localization. And this principle has for ages been taken advantage of by physicians in attempting its cure. The skin is of all other structures by far the most desirable upon which to fix inflammatory action, as from its great extent, generally allowing some portions of it to remain in a state of integrity, and from its peculiar vital relations it may be made the subject of this with greater safety to life and convalescence than could any other organ. Hence arises the very common practice of blistering in certain stages of all internal inflammations. And on principles no less true should it be endeavoured, in the treatment of all contagious diseases, to render the functional activity of the skin as entire as possible—not, of course, to the exclusion from attention of other very important indications. Besides the function of excretion the mucous membrane, especially the pulmonary and gastro-enteric, performs the very important office of absorption, making their implication in disease sustain wider and more important bearings. It is well known how diligently the mucous membrane, that of the bowels particularly, should be attended to in contagious diseases, and indeed in all diseases whatever. It seems probable that a great variety of measures, often so beneficial in the treatment of contagious diseases, may act at least partly by promoting mucous and cutaneous excretion. Aperients and purgatives, so generally exhibited in such diseases, clear the mucous membrane of the bowels, and evidently promote its excretory function. Baths of various descriptions likewise, by cleansing the skin, and rendering its functions more energetic, are of the greatest utility, both in health and disease. The cold shower-bath, so generally used some years ago in the treatment of various fevers, and the tepid sponging, often so signally beneficial, may derive much of their usefulness from their rendering the skin more healthy, and thereby giving energy to its peculiar functions. When in such diseases as scarlatina and others of the exanthemata the cutaneous inflammation has risen to a high degree, the cold douche is of the utmost service by its sedative influence repressing general reaction, and lowering the vascular excitement of the skin, thereby fitting it for a more healthy action. And such a means must be beneficial on the accession of reaction in all fevers. It is needless to say that, in the course of these, frequent sponging with tepid water and vinegar, followed, when the state of the skin will permit, by moderate friction with warm soft towels, will much conduce to speedy convalescence.

To conclude, it seems evident that the sustainment of health is considerably dependent upon a normal state of the skin and mucous membrane as excretory organs. Every means, therefore, calculated to uphold this state, will operate for the promotion of health. When the body has been exposed to any kind of contagion, the best means for having it speedily thrown off from the system are those which give a healthful energy to the organs of circulation, and promote elimination at the excretory surfaces. For it is not improbable, that, when a contagious poison has been received into the system, a sluggish excretion, by allowing it more time to act, will give effect to its influence in the production of disease. Immediately after exposure to contagion, therefore, such means as cold shower baths, friction applied to the skin, &c. according to circumstances, and especially "vigorous exercise in the open air," as advised by Dr Christison, will act powerfully in warding off the development of disease.

The following propositions, imperfectly illustrated in the foregoing remarks, may be offered to the profession for further consideration.

1*st*, In the whole assemblage of vital functions, subservient to unperverted nutrition, there are none of greater importance than absorption and excretion, the mucous membrane being the principal seat of the former, while the latter is carried on by a variety of organs, amongst which the skin and mucous membrane hold an important station.

2d, The integrity of the excretory functions of these structures is an important element in the economy of health, as their derangement is frequently productive of disease.

3d, There is a large class of diseases that affect the human body, part of whose operation is the subversion of those normal actions constituting healthy nutrition, and the establishment of abnormal products throughout the whole bodily structure, whose excretion is necessary to the resolution of disease; for effecting this purpose, the skin and mucous membrane are much and usefully employed.

4th, In determining a system of hygiene, as well as of therapeutics, the importance of the skin and mucous membrane, as organs of excretion, should not be lost sight of; and, as it is probable that a great variety of agencies, remedial and prophylactic, whose immediate action is on the nervous system, or on the strength and velocity of the contractility of the organs of circulation, produce in reality their good effects through these means, by influencing the excretory functions of the above structures, as well as others, it will be highly useful to have constantly in view those conditions of the nervous and circulating systems connected with the integrity or the reverse of these functions.

ART. X.—*Case of Empyema terminating favourably by spontaneous opening.* By SAMUEL SHORTRIDGE, Esq., Surgeon, Port-Glasgow.

UPON 5th October 1838, I was taken to visit J. P., of a stout robust appearance, who presented the usual symptoms of acute inflammatory fever, accompanied with cough, dyspnœa, and a fixed pain near to the inferior border of the left scapula, extending across the posterior surface of the chest.

He mentioned that, two days previously, while engaged in raising a heavy piece of timber, "he felt something give a crack" in the foregoing position, which, however, did not prevent him continuing his employment during the entire day, but that, upon the following day, while rowing a boat, he became chilly and squeamish, and was forced to bed, when the above symptoms made their appearance. When seen by me, I took blood to syncope, and prescribed an antimonial saline mixture, some powders containing calomel and antimonial powder, and applied a sinapism to the painful part.

On the following day, there being no improvement, the blood-letting was repeated, a large blister was applied, and the medicine continued. The sputa, which now became more copious, from its rusty character, and the ordinary stethoscopic indications, enabled me to consider the inflammatory action to have extended to the substance of the lung. The usual antiphlogistic measures were continued; blisters repeated from time to time; and in the course of a few days, the acute febrile symptoms subsided; but there still remained the fixed pain near the scapula, frequent cough, copious expectoration, and a total inability to lie upon the right side, any attempt at which greatly aggravated the cough and dyspnœa. Very little benefit was derived from the treatment adopted; colliquative perspirations were superadded, to ameliorate which, mineral acid and quinine were had recourse to.

Towards the end of December, debility and emaciation had advanced progressively, and a fulness was observed over the left side of the chest, although no difference in its capacity was found upon measurement; percussion on the part elicited a dull sound; and the respiratory murmur was very faint, although audible over the subclavian region; and a few days after, a soft tumour appeared on the fifth intercostal space, an inch below, and to the outside of the left nipple. Upon the day of this discovery I contemplated the propriety of puncturing the tumour, but deferred doing so till the following day, requesting support to be given by a bandage, lest it might be ruptured during coughing; as I had some expectation that the cavity might be ruptured, since, during the few days previously, there had taken place an ejection of purulent fluid, occasionally to the extent of two pints at one time, which flowed freely, and without effort from the mouth, and sometimes so as to endanger suffocation.

Having delayed the puncture, as hinted, I found the next day that the surface of the tumour had ulcerated, and my patient lay bathed in purulent matter, the bed and clothes being fully saturated with it. The purulent matter continued to flow daily from the aperture, and some came afterwards by the mouth. My patient was afterwards kept comfortable by evacuating the purulent matter night and morning to the extent of a pint, which was facilitated by turning him to the left side, and requesting a full inspiration and a cough to be made, when a soft pledget with a quantity of tow and a bandage was applied.

The cough and dyspnœa were now greatly relieved; a generous diet with porter, together with the acid and quinine, were prescribed, under which he gradually regained so much strength as allowed him to go out of doors by March 1839, and henceforward he continued still so weakly as only to be able to walk a very short distance, while the purulent matter was continued to be evacuated night and morning, in nearly the same quantities as at first, by removing the bandages, &c. until three weeks ago, when blood appeared instead of purulent matter, and the wound thereafter closed, leaving a flattened thimble-like cavity, into which the point of the finger could be introduced; and he has since progressed in strength.

Upon examination, the movements of both sides of the chest are equable, and the respiratory murmur natural, as also the sound elicited by percussion.

The successful result of this case may, perhaps, be regarded as a support to the practice generally adopted, of gradually evacuating such collections, as it is very probable that only as much purulent matter flowed in the first instance as reduced it to the level of the aperture.

Whether or not the *origo mali* was some injury the pleura could have suffered while making the vigorous effort stated, or was the result of the chill while in the boat, or both combined, may appear doubtful, but that the former had some considerable share, may be argued from the pain persisting in that locality, even up to within a short period of his final recovery.*

Port-Glasgow, 6*th June* 1842.

ART. XI.—*On a new Remedy for Scalds and Burns.* By WILLIAM RHIND, Surgeon, Edinburgh.

THERE are so many circumstances which lead one to be deceived in the operation of a new remedy, that I would with considerable diffidence have called the attention of the profession to the following facts, had not a lapse of a good many years, and repeated trials and strict observation confirmed me of their accuracy.

As in most other cases of remedial substances, a mere accidental circumstance first directed my attention to this discovery. In the year 1828, having let fall a drop of melted sealing-wax on the point of the finger, by which it was rendered extremely painful, I plunged it into a solution of gum-arabic, this being the only fluid substance at hand. In a few minutes I was surprised to find that the pain had completely ceased. I allowed this gum to harden on the part, and on washing it off several hours afterwards, I found the cuticle hardened and separated from the cutis, indicating the usual severity of the burn, but there was no blister or effusion of serum, and no pain or injury of the cutis. From this circumstance I resolved to try the farther effects of solution of gum-arabic in burns, and the following cases, which I find in my note-book, occurred some time after.

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* The case here detailed by Mr Shortridge is extremely important, in illustrating the mode which nature often adopts, in order to effect a cure in cases of pleurisy terminating in empyema. In all cases in which, as in the present, a circumscribed pointing tumour is formed, it is of little moment whether the puncture be made or not. It may be made with much greater chance of ultimate recovery, than where no such pointing tumour is formed. But if not made, the tumour forms a spontaneous opening as in the present case. The reason seems to be, that adhesions to considerable extent have previously taken place internally, and have thus circumscribed the matter, which, according to the principle long ago pointed out by John Hunter, finds its way naturally to one or other of the surfaces of the body.

When no pointing tumour forms, there is a manifest and decided contraindication to the operation; and it very rarely succeeds in such circumstances.—EDITOR.

1828, April 9. A boy (aged 12) called on me at nine o'clock evening. He had been firing off crackers of gunpowder, one of which had exploded and severely scorched the palms of both his hands and his fingers. The parts were red with excessive pain, and on one hand were three or four small blisters; these I opened, and pressed out the serum, and then with a large camel hair pencil smeared both hands over with a thick solution of gum-arabic. I went over the parts several times with this solution, so as to fix it completely over the surface of the skin, and then sent the boy out into the cool air. He returned in half-an hour. The pain of one hand was quite gone, and the other much easier. The solution was repeated till it thickly incrusted the hand, and he was again desired to walk about in the cool air, and to avoid hanging or moving the hand. In a very short time he again returned with the hand completely relieved of pain except in one spot, between the fingers, where the solution had not been applied. Here there was a small blister, which was immediately snipped, and after pressing out the serum the part was covered with the solution. At ten o'clock both hands were quite easy, and he expressed much satisfaction. During the night he felt no pain or unusual heat in his hands. Next morning he washed off the thick crust of gum, and when I saw him the cuticle of his palms was quite hard, and had all the appearance of a severe burn, but no more blisters had risen, and the few that had been opened discharged a little serum, but healed without giving any farther trouble.

1828, November 8. A workman employed at a brass-foundry got his face very much scalded by a quantity of hot lead or solder falling on it. I saw him a few minutes after the accident. Large patches about his eyelids, cheeks, forehead, and his lower lip, both outside and inside, were very much reddened, and were apparently beginning to rise into blisters. He complained of intense hot pain. Portions of the melted solder were picked from his lips, eyelids, and nose, and a solution of gum-arabic was applied immediately over the whole extent of the injured parts. Repeated coats or coverings of this solution were applied at intervals of about five minutes till the whole began to harden over the face. He was desired to go home and keep himself in a cool place, and, if the pain did not abate in less than half-an hour, to return. I saw him in an hour, the pain had so completely left him that he was at dinner. No blisters rose in this instance. A slight discharge occcurred in two or three spots where the skin had been destroyed, but these healed in a very short time.

In my notes I find several other cases of burns and scalds in subsequent years, treated in a similar manner and with a like success, the details of which, however, would not afford any interest. In some of these cases an hour and more had elapsed since the accident, and oils and other applications had been used. In such instances, the skin was cleaned of the oily matters, by sponging it with soap and water, and then the solution was applied. In every case relief was procured in a very short time. The more recent the case, however, the more speedy was the removal of the pain. In those cases where blisters had appeared they were opened, and the solution was then applied; very frequently the application of the solution prevented the effusion of more serum; in some cases, however, serum was again effused and again evacuated. The last case which I have on record was 1840, March, Mrs ——, in reading too near to a candle, set fire to her gown at the shoulder, the thin fabric consumed immediately and severely scorched her arm. I saw her about ten minutes after. The whole shoulder and arm, embracing the space over the deltoid muscle and the greater part of the inside arm, were severely burnt, and she felt great pain. A thin solution of gum-arabic was immediately applied, while a thicker one was preparing, and several coats of this latter were spread over the parts repeatedly in the course of half-an hour. An hour after the accident the pain was almost entirely gone. A few blisters had risen about the inside of the arm; these were snipped, and the solution repeated. Next day, this patient had experienced no farther uneasiness from the arm, but the agitation and fright had brought on labour nearly about the full time. She was delivered of a still-born child, and had a good recovery. The blistered parts of the arm skinned off when the solution was washed away; the abraded parts were sprinkled with a little flour, and healed in a few days.

I have not had an opportunity of treating any cases of burning where there was much destruction of skin or soft parts, and therefore cannot say what effect the solution would have on those. I would suggest, however, that, if applied in such cases, a thin layer of raw cotton should either be smeared with the solution, or applied immediately after the fluid has been brushed over the parts, in order to form a sort of substitute for the skin, and a means of retaining the gum-arabic solution.

In those distressing cases of the extensive burning of the bodies of young children, I would not hesitate applying the solution over the whole body, at about the warmth of 96°. It does not cool down the system by sudden evaporation or sudden abstraction of heat like a common cold fluid, a circumstance in most cases to be dreaded, for gum is a bad conductor of heat; neither does it preclude an exposure to moderately cool air, which seems to keep down the excessive irritation consequent upon extensive scalding of the skin.

As it is of consequence to have the solution prepared instantly, the powdered gum, if it can be procured, may be in a few minutes dissolved in warm water. If this is not ready prepared, the common gum in small particles roughly pounded, will very soon dissolve, and the application in any case may be applied at a temperature of 96° or 100°, although in general it is more soothing when applied colder. Rancid gum solution should not be used, as it in this state has lost its adhesive quality. Two, three, or four applications may be necessary at intervals of five or ten minutes. The skin should be previously freed of all oily matters, and the first coating, in order that it may be insinuated closely into the furrowed surfaces of the skin, should be rather thinner than the subsequent ones. In order to produce the proper effect it should form a varnished coat of some thickness and closeness over the whole space of the burnt part.

With regard to the *modus operandi* of this substance, I am as much in the dark as we usually are with the mode of action of most other well-known remedies. I am unable to say whether it has a specific action, or whether it allays the inflammable irritation of the skin, by effectually excluding the external air, and by its being a bad conductor of heat.

The first proposition might be so far tested by trying if other gums and mucilages, or isinglass, for example, produced a similar effect. This I have not tried.

From some experiments, which, however, were never completed, that I instituted some years ago, regarding the influence of oxygen on inflamed tissues and vessels, I am inclined to think that the exclusion of atmospheric air influences very much inflammatory action, and in this way, perhaps, the gum solution checks the inflammation of the skin in burns. Inflammation caused by touching the skin with nitrous acid and other irritants, appears to be suddenly allayed by a solution of gum-arabic; erysipelatous spots on the skin seemed also in some trials influenced by this application. And I may here suggest, that it might be tried in the first stages of the pustules of small-pox, especially those of the face, with a view to modify their development, and prevent pitting.

In conclusion, I deem it proper to mention, that, several years ago, I communicated the effects of this remedy to friends, both medical and others, and that several cases have been treated according to the above directions with uniform success. A few of those cases I find noted, but I do not perceive that they present any farther facts worthy of detail.

8, *Hart Street*, *July* 1841.

PART II.

CRITICAL ANALYSIS.

Art. I.—*Lectures on the Diseases of the Urinary Organs.* By Sir Benjamin C. Brodie, Bart., F. R. S., Sergeant-Surgeon to the Queen. Third Edition, with alterations and additions. Pp. 379. London, 1842.

On the subject of the Diseases of the Urinary Organs, which is both difficult and complicated, many treatises and essays, various in extent and merit, are from time to time appearing. The present volume, however, possesses peculiar claims on the attention of the surgical, and we add the medical reader. While not a few of the publications on the class of diseases now mentioned proceed from surgeons, who, though industrious, well-informed, and possessed of considerable talents, are nevertheless young, and consequently without the advantage of very extended experience; the present treatise is the production of one who has been long distinguished for the extent of his knowledge, the accuracy of his observations, and the originality of his remarks, and who now presents to his brethren and juniors the results of a long series of years of experience, and all that fund of information which may be expected to result from long and diligent service as an hospital surgeon, and much experience in private practice.

The work is arranged in the simplest manner, that of a consecutive series of discourses or lectures, fifteen in number, in which the author explains very fully and clearly, and in a manner quite practical, 1*st*, The diseases of the urethra and their treatment; 2*d*, The diseases of the bladder and prostate gland, and their treatment, so far as they admit of it; and 3*d*, The history of urinary calculi, and their causes and effects, with the methods furnished by surgery for removing or counteracting them.

We do not propose, in giving an account of the most important subjects treated in this volume, to follow the author's division of lectures, which is in some respects arbitrary and accidental. We shall adhere to his general arrangement, however, and notice the principal novelties in theory and practice which he introduces in the several subjects treated.

Under the head of stricture of the male urethra is given a correct account of that lesion and its anatomical characters. But of this there is one variety, Sir Benjamin observes, in which the symptoms cannot be traced to perceptible anatomical change in structure. At all events, he says it is only from observation of what happens in the living body that we learn one of the most important circumstances in the history of this disease. The degree of facility with which the urine is voided varies from day to day; and the size of the stream, consequently, varies also. The difficulty in micturition, also, the author represents almost immediately to follow copious libations of those liquors which cause the urine to be loaded with excess of lithic acid or lithate of ammonia, for instance, punch or champagne; and he observes that it may subside even more suddenly than it took place after the pressure of a full-sized bougie against the anterior part of the stricture, or the application of the nitrate of silver. The permanent alteration in the condition of the urethra disclosed by dissection, does not account for these phenomena, which must, therefore, be referred to some power of contraction existing in the living body, and wanting in the dead. Numerous facts, he thinks, met with in practice, cannot be otherwise explained; and those conversant with such cases doubt not that the distinction between spasmodic and permanent stricture is founded on fact.

Spasmodic stricture, the author represents to be always situate in the membranous portion of the urethra, where the canal is surrounded by a sphincter muscle of no inconsiderable size, connected by a double tendon to the arch of the pubes. A particular description of this muscle is given by the late Mr Wilson in the first volume of the Medico-Chirurgical Transactions; and he thinks it not unreasonable to infer that it is the real seat of these spasmodic affections. A probable proof of this is furnished by the fact, that, in the anterior part of the canal, where there are no muscular fibres in immediate contact with it, nothing like spasmodic stricture is observed.

At the same time it must be allowed that pure spasmodic stricture is comparatively a rare disease. Either the spasmodic contraction is in a great degree, if not altogether, induced by the existence of some degree or form of common permanent stricture; or spasm of the urethral muscles, however induced, eventually gives rise to permanent thickening of the mucous membrane.

Stricture affecting the external orifice and anterior extremity of the urethra, is often connected with adhesion of the inner surface of the prepuce to the glans; a state which may be the consequence of congenital narrowness of the prepuce, combined with deficient attention on the part of the nurse, to the cleanliness of the child. Hence patients labouring under this form of stricture usually declare that they know not when the disease began, and that they cannot remember the time when the urine flowed in a full stream. Though the contraction thus established proceeds increasing, it rarely occasions inconvenience, till after the middle period of life. In other instances, stricture situate at the anterior part of the urethra, seems, as in ordinary circumstances, to be the result of chronic inflammatory disorder of the mucous membrane. A slight degree of pain in making water, a gleety discharge approaching more to mucus than pus in character, and a diminution in the stream of urine, proceeding more rapidly than when the disease appears in childhood,—followed by gristly induration in the substance of the *corpus spongiosum*, are the leading symptoms which distinguish the presence of this affection.

It is one of the great peculiarities of stricture of the urethra, that after some time it gives rise to various other changes. On the inner surface are small irregular eminences or tubercles which consist of minute deposits of lymph, which have become organized. A narrow membranous band or bridle unites the opposite side of the canal. The orifices of the mucous glands and those of the prostatic ducts became dilated, and the whole canal behind the stricture is widened or enlarged. In other instances a hard cartilaginous tumour is formed, chiefly in consequence of the effusion of lymph into the *corpus spongiosum.*

The symptoms to which this disease gives rise are well known. More or less difficulty in making water, with diminution in the size of the stream, or bifurcation, and mucous or muco-purulent discharge are the most usual symptoms. When difficult micturition takes place in the aged, however, there is reason to suspect the existence of enlargement of the prostate gland, which may either be the sole malady, or take place along with stricture. Complete retention does not take place till a late period of the disease.

In spasmodic stricture, on the other hand, difficult micturition is not constant, nor does it approach gradually. In some instances, according to the author, the urine is suddenly retained in consequence of some irregularity in diet, exposure to cold, or the application of a blister. In a series of cases which the author represents to be more common, the disorder betrays its presence in the following manner:

"The patient voids his urine in a diminished stream. The diminution gradually increases, being sometimes attended with a slight mucous or muco-purulent discharge. By-and bye there is a complete retention of urine. This subsides spontaneously, or is relieved by art. After an interval (which may vary from weeks to months, or even to years), he is overtaken by another attack of retention. During the whole of this time the stream of urine continues to become smaller; it is flattened, or otherwise altered in shape, or divided into two. At last the urine never flows in a stream larger than a thread, nor without great effort and straining. In some cases it dribbles away constantly and involuntarily, and the patient's clothes by day and his bed at night are absolutely sopped with urine, making him disgusting to himself and to all around him. This involuntary discharge of urine does not indicate an empty and contracted bladder. The bladder, in fact, is loaded with urine, and it is when it does not admit of further distension that the urine overflows, and all beyond a certain quantity escapes without the patient being able to prevent it, the bladder being at the same time to be felt like an enormous tumour in the lower part of the abdomen. The exceptions to this rule are very rare; and it applies not only to the involuntary flow of urine in cases of stricture, but also to that which takes place under other circumstances."—P. 11.

This description is perfectly accurate as to the effect on the bladder and the state of the bladder. But we have doubts whether it is the exclusive or even the usual effect of spasmodic stricture. The enuresis from over-distended bladder, such as is now described, is certainly often the result of paralysis of the bladder, whatever be the remote cause.

" The symptoms of retention of urine are sufficiently formidable, and not the less so as they generally attack the patient suddenly. He is perhaps sitting with his friends after dinner, and feels an inclination to make water; in attempting to do so, however, he is disappointed. A second and third attempt are made after some time, and all without success. Now the case assumes a more serious aspect. An indescribable uneasiness is felt in the region of the bladder. The efforts to void the urine are no longer voluntary. The patient is compelled to strain, and the whole of the abdominal muscles are in convulsive action, instinctively endeavouring to relieve the bladder of its contents, but still to no purpose. The bladder may be felt hard and enlarged above the pubes. The heart sympathises with the local irritation, the pulse is hard and frequent, the face flushed, the skin hot, and the tongue is covered with a white fur. The violent efforts of the patient force out a few drops of urine, which give some relief; but the kidneys go on secreting, and the relief is only temporary. In the great majority of cases the spasm is spontaneously or artificially relieved; but there are, nevertheless, numerous examples to the contrary, in which the retention terminates in death. The bladder itself may be ruptured at the fundus, the urine escaping into the cellular membrane, and into the cavity of the peritonæum. Such an event occurred in St George's Hospital many years ago. The patient exclaimed, after a violent paroxysm of straining, that the bladder had burst into the belly. He died; and on examining the body, it was ascertained that the poor fellow's words were true. This case, and another similar one, have been published by Sir Everard Home. Fortunately such cases are rare."—Pp. 12–13.

The rupture, indeed, is most usually in the urethra behind the stricture; and of this the effects are most serious, and in aged or corpulent subjects most usually fatal. The urine is extravasated through the laceration into the surrounding cellular tissue, in which it creates bad inflammatory action, which terminates in gangrene. In general the first indications of this action are comparative, but temporary relief to the patient, diffuse swelling all round the perineum, scrotum, and penis; redness, tension, and hard swelling of the skin; then several black or dark-coloured sloughs of the parts, with a doughy feeling beneath; and, if incisions be made, fetid purulent matter, urine and sloughs of the adipose membrane escape. At the same time very bad general symptoms ensue. Rigors are followed by heat, thirst, quick full pulse, and some delirium; afterwards the pulse becomes more feeble, sometimes irregular or intermittent; then follows low delirium with hiccup; and eventually coma and death.

This is the extreme case. It nevertheless is one of frequent occurrence in the class of subjects above designated. If the effusion take place in front of the triangular fascia of the perinæum, or if in any way the urine passes forwards to the superficial parts, instead of penetrating to the deep-seated, and finds its way to the surface, and if, above all, the surgeon quickly recognizes the disorder, and promptly makes incision, then life may be preserved.

In some rare cases a stricture seems to be partially or wholly destroyed by ulceration. Of this Sir Benjamin relates a probable example in a gentleman, who, after labouring under stricture for several years, was attacked, in the act of attempting to empty the bladder, with acute pain, which became intolerable, and was compared to the feeling produced by melted lead being poured into the canal. These sufferings, after lasting for several days, began to abate; and it was then observed that the urine flowed in a larger stream. The symptoms disappeared, and the patient improved, and made water more easily than he had done for many years.

Another mode of termination is by the formation of abscess of the urethra and *fistula in perinæo;* a result which is always attended with fever and more or less general disorder of the system.

Besides the terminations now mentioned, Sir Benjamin notices those in which the fistulous opening from the urethra takes place in the *nates*, in the groin, or in the scrotum; one he mentions in the hypogastric or supra-pubal region; one among the adductor muscles of the thigh; a third among the muscles at the upper part of the right thigh, as far outwards as the thyroid hole of the ischium; and cases in which it had opened into the rectum, forming a urethro-rectal fistula.

The connection between stricture and more or less disease of the prostate is so common that it appears to be more than accidental. At the same time Sir Benjamin represents it to be not so common as it is by some surgeons supposed to be. The following observations present the result of the experience of Sir Benjamin on this subject.

"1. Where a simple chronic enlargement of the prostate gland supervenes on stricture of the urethra, the latter usually becomes less liable to spasm, and is more easily dilated, and altogether more tractable than it was before; a change in its condition which is easily explained; as the pressure of the urine against the stricture when the patient strains in making water is a constant source of irritation, which is in great measure removed as soon as a new impediment to the flow of the urine between the stricture and the bladder is established by the tumour of the prostate.

"2. But where the disease of the prostate goes beyond a mere enlargement, and suppuration has taken place in its substance, an opposite effect is produced on the stricture; the abscess itself becoming a source of irritation, rendering the stricture more sensitive and more liable to spasm than it would have been otherwise.

"3. Although the combination of stricture with enlarged prostate is common enough, it is not so common as it is by some surgeons supposed to be. An old man, who has a frequent desire to void his urine, and voids it slowly and with difficulty, applies to a surgeon whose hand is light and accustomed to the use of the catheter. The instrument is then introduced readily, or, at any rate, meets with no obstruction until it reaches the neck of the bladder, and the case is set down as one of enlarged prostate, which it really is. Another old man, under precisely similar circumstances, applies to a surgeon who uses the catheter rudely and incautiously. The urethra resents this rough usage; spasm is induced, and the point of the catheter cannot be passed further than the membranous part of the urethra. The case is then supposed to be one of stricture, and is treated as such: I need not tell you to how little purpose."—Pp. 22–23.

The author then proceeds to show how stricture and disease of the prostate give rise to acute or chronic inflammation of the mucous membrane of the bladder, to dilatation of the bladder, to hypertrophy of the muscular coat, to the formation of sacculi in the organ, to the occurrence of abscesses round its neck, and to the production of enlarged and indurated testicle. The latter effect, which Mr Ramsden regarded as a very frequent occurrence, Sir Benjamin thinks to be very rare, and dismisses the hypothesis of Mr Ramsden very summarily with the sarcastic observation, that he needs make no comment on such a fantastic hypothesis.

In treatment the author cautions against the idea so generally prevalent, that, in all cases in which it is difficult to introduce a bougie, there is stricture; and he afterwards subjoins the following judicious observations:

"There is a fashion in diseases, or rather (to speak more properly) there is a fashion in the opinions entertained as to the prevalence of particular diseases, and when the attention of the medical profession and the public has been especially directed to a certain order of cases, such cases are almost invariably supposed to be much more common than they really are. A very few years ago it was so with respect to the disease which we have now under consideration. If a man had a troublesome gleet; if he had an indurated testicle; if he had a priapism at night; if he had a frequent inclination to void his urine; if he was impotent, or believed himself to be impotent; if the stream of urine was not perfectly cylindrical; or even if he was liable to an herpetic eruption on the prepuce; he was supposed by many surgeons to be labouring under stricture of the urethra, and was at once subjected to the unnecessary use of bougies. The number of persons who at this period were supposed to have a stricture of the urethra, and who really had no such disease, and many of whom had no disease at all, was not less than that of the young females who, at a still later period, have been the victims of another mischievous delusion, being laid up for years together on a sofa, under the supposition that they laboured under disease of the spine or hip, when in reality they suffered only from hysterical pains and spasms, which air and exercise would have cured, but which confinement and nursing, and the attendance of physicians and surgeons, have only tended to aggravate. I dwell on this subject because I am anxious that none of my pupils should fall into an error so discreditable to themselves, and so mischievous to society."—Pp. 31-32.

He examines very carefully the different methods of treating both stricture and its effects, especially that of retention of urine; and, after endeavouring to estimate the respective merits of each, he draws the following conclusions:

"After all, there is no absolute rule as to the treatment of retention of urine from stricture. One person is relieved in one way, another in another; and you will do well in each case to bear in mind the particular mode of treatment which has proved of service, in order that you may at once resort to it, if you are called a second time to the same patient, under the same circumstances. In one instance, you will be able to pass a catgut bougie, and not a catheter; in another, you will be able to pass a catheter, and not a catgut bougie. One individual is relieved by opium, another by the warm bath. A gentleman of my acquaintance, who was subject to attacks of this description for a considerable time, almost always began to make water after a pint of warm water had been thrown up as a clyster. To show what various treatment is necessary, I have been in the habit of mentioning the following case. A gentleman, who had been long in hot climates, laboured under an old stricture of the urethra. He was able to pass a bougie for himself; and he did this at regular periods, and for a long time experienced little or no inconvenience from his disorder. One night, however, he was seized with retention of urine, and called me out of my bed in consequence. I introduced a gum catheter, which entered the bladder with perfect ease, and drew off the urine. He called me up another night, and another, and another still; and one night he called me up twice. At last, it occurred to me that he always sent for me on the alternate nights; and on inquiry, I found that the attack of retention regularly came on about twelve o'clock, and even though the catheter had entered the bladder, the spasm did not relax, so as to enable him to make water by his own efforts, until five or six in the morning. I determined then to treat the case as we do many other intermitting and periodical diseases; and I prescribed him the sulphate of quinine. The first night after he began to take it he had an attack of retention; but he had no attack afterwards." —Pp. 39–41.

In considering the methods of treating strictures of the different portions of the male urethra more particularly, we find that the author by no means adheres to the beaten path. In the case of strictures at the orifice of the urethra, which are often so firm and cartilaginous, and attended with so much contraction of the canal and its surrounding textures, that all attempts to dilate are attended with extreme pain and irritation, he recommends what he has occasionally practised, viz. dividing the contracted part of the urethra by means of a pair of knife-edged scissors, one blade with a blunt point being introduced into the urethra, and the division being made in the situation of the perinæum.

In the treatment of stricture of the anterior portion of the urethra, he recommends the diligent use of the bougie or metallic instruments.

In the treatment of strictures at the bulb of the urethra, which may be and often are complicated with a degree of spasm, he varies the method considerably.

"If you were to ask me, How then do you treat strictures at the bulb of the urethra? my answer would be, I have no particular method: sometimes I adopt one method, sometimes another, according to the peculiar circumstances of the case. I shall describe the different plans of treatment to which you may have recourse, at the same time endeavouring to point out the particular class of cases to which each of them is applicable.

"I should premise, that the disease is not to be cured by medicines; though medicine may sometimes be used with advantage in aid of the local treatment. Thus, where the liability to spasm is increased by a too abundant secretion of lithic acid by the kidneys, whether it shows itself in the form of red sand, or of small calculi, or of lithate of ammonia, attention to the diet and mode of life, and the exhibition of purgatives and alkalies, and such other remedies as may tend to restore the urine to a healthy condition, will be of essential service, and will enable you to accomplish, by means of the bougie, what you would in vain have attempted to accomplish otherwise. In like manner, in cases of alkaline urine, a generous diet, and the exhibition of mineral acids, opiates, and tonics, will be productive of a similar advantage. In all cases attention should be paid to the state of the bowels, and the patient should be made to understand that a careful and regular mode of life in every respect is necessary to his recovery; and that violent bodily exercise, especially riding on horse-back, is always to be avoided. In long-standing cases of unusual difficulty and complication, I have sometimes found it necessary to keep the patient confined to a sofa, or even to his bed, for some days before I began the peculiar treatment which his case required. Where, before the patient comes under your care, instruments have been much employed, without having penetrated through the stricture, it is always desirable that the urethra should be left for some time in a state of repose. At the end of a month or six weeks, the false passages (if any existed) may have healed; the inflammation produced by previous operations may have subsided; and you will begin the treatment under much more advantageous circumstances than if you had entered upon it in the first instance.

" The methods which are chiefly useful in the case of stricture at the bulb of the urethra are:—*1st*, the dilatation of it by means of the common plaster bougie; *2dly*, the dilatation of it by means of a metallic bougie, catheter, or sound; *3dly*, the retention of the elastic gum catheter in the urethra and bladder; *4thly*, the application of the bougie armed with the nitrate of silver."—Pp. 49–51.

Among metallic instruments, Sir Benjamin prefers, when they are small or of middle size, those which are made of solid silver; the large bougies he recommends to be of silver or steel, or steel-plated, or of a composition similar to, but much firmer, than that of the flexible metallic bougie. To the use of the latter, indeed, he is decidedly opposed, and we think with very good reason. His directions for the introduction of the instrument are extremely good.

The use of the elastic gum catheter he employs chiefly when it is desirable to dilate the urethra and remove the stricture in a short space of time; when the stricture is gristly and cartilaginous, and therefore not easily dilated by ordinary means; when, from long continuance of the disease, the urethra has become irregular in shape, or when a false passage has been previously made; and, lastly, whenever the introduction of the bougie is followed by severe rigor. The latter occurrence, he observes, seldom follows the use of the bougie immediately; and most usually it takes place upon the first atttempt to pass water afterwards, showing us, the author thinks, that it is not the effect of the bougie, but the consequence of the urine flowing through the part which the bougie has dilated. Is this, then, the consequence of the urine touching and irritating a raw excoriated surface? Most likely it is, if the fact be constant. At all events, Sir Benjamin recommends that in such cases the elastic gum catheter be employed, and allowed to remain for some time, because, by this contrivance, he argues, as the urine flows through the catheter, its contact on the urethra is prevented, and the rigor also is prevented from taking place.

The treatment by the application of nitrate of silver, the author restricts chiefly to the following classes of cases:

" *1st*, Those of spasmodic stricture, where two or three applications of the caustic may be sufficient to relieve all the urgent symptoms. *2dly*, Some cases of old stricture, in which there still is a considerable disposition to spasm. In these last cases apply the caustic two or three times, and no oftener. It will probably relieve the contraction as far as it is spasmodic, and thus enable you to proceed more advantageously with the use of the bougie or metallic sound. *3dly*. The caustic may be used very properly in some cases of stricture which are endowed with peculiar irritability, in which every application of the common bougie induces severe pain, or brings on spasm, preventing it entering the stricture. Two or three applications of the caustic may be sufficient to deprive the stricture of that unnatural sensibility which otherwise would have foiled your efforts to effect a cure.

" Notwithstanding what I have now stated, I very rarely use the armed bougie in my own practice, and I never resort to it in the first instance. My reasons for preferring the other methods of treatment in ordinary cases are these: *1st*, Although the caustic often relieves spasm, it also very often induces it. It is true, that in many instances it enables a patient to make water with more facility; but in many instances, also, it brings on a retention of urine. *2dly*, Hæmorrhage is a more frequent consequence of the use of the caustic than of the common bougie, and it sometimes takes place to a very great and to an almost dangerous extent. *3dly*, Where there is a disposition to rigors, the application of the caustic is almost certain to produce them; and frequently the application of the caustic induces rigors where there had been no manifest disposition to them previously. *4thly*, Unless used with caution, the application of caustic may induce inflammation of the parts situated behind the stricture, terminating in the formation of abscess. I have known some cases of abscesses formed under these circumstances, which, from their peculiar situation, have proved more troublesome and more difficult to manage than the original disease. In one case, which came under my observation many years ago, and in which, from the account given me, I was led to believe that a surgeon had been too liberal in his application of caustic to a stricture, a succession of abscesses took place, extending in various directions, even to the nates, and attended with great disturbance of the constitution. The patient went into the country, where, as I have been informed, he ultimately sunk under the combined effects of the stricture and abscesses."—Pp. 60–62.

Of the method proposed by Mr Arnott of dilating a stricture by the introduction of a tube of varnished silk, which is then to be dilated by impelling air into it by a syringe, he speaks in terms of doubt and disapprobation. If the stricture, he argues, be much contracted, then the introduction of the dilator is impracticable. But, on the other hand, if it be practicable to introduce the dilator, then is it equally practicable to introduce a bougie or sound of middle, or even small size, the further dilatation is easy enough, and neither of the dilators is wanted. The chief argument used by Mr Arnott is, that it enables you to carry the process of dilatation farther than it can be carried by a bougie or sound, and that this kind of farther dilatation removes the tendency in the stricture to contract, and thus produces a permanent cure of the stricture. Of the first of these assertions he doubts the correctness entirely; and the second is altogether at variance with the results of his own experience as to the use of very large bougies. The dilatation of a stricture beyond the natural size of the canal he has generally found to be followed by pain and other symptoms of inflammation, and an aggravation instead of a diminution of the complaint.

The practice proposed by Mr Stafford, of dividing the stricture by a cutting instrument or the lancetted stilette, he thinks not well calculated for general use, and unless great caution be used, rather likely to cause false passages, which might be followed by effusion of urine and purulent deposits. A modification of the practice, however, he regards as free from these dangers, and capable of being employed in certain cases with great advantage. This consists in first introducing a full-sized plaster bougie, the end of which is allowed to rest or press on the stricture, then making an incision in the perinæum, dilating the fistulous sinus if it exist, and laying open the membranous part of the urethra as far forward as the stricture, the exact situation of which is marked by the bougie already introduced. The bougie is then withdrawn, and in its place is introduced an instrument consisting of a straight silver tube, closed at its extremity, except a narrow slit, through which, by pressing a stilette at the handle of the instrument, a small lancet is made to project, and thus divide the stricture. A silver catheter is then readily introduced through the urethra and the divided stricture, into the bladder, and there allowed to remain for two days, the urine flowing through it. At the end of this time the silver catheter is withdrawn, and an elastic gum one introduced. The wound in the perinæum is healed, and the patient recovers, making urine in a full stream, and being able to introduce a full-sized sound into the bladder, so as to prevent the contraction from recurring.

"The instrument used on this occasion was ten inches in length, exclusive of the handle, and rather more than one-quarter of an inch in diameter. The lancet measured three-sixteenths of an inch at its broadest part; it terminated in a sharp point, and could be made to project by pressing a button on the other end of the stilet, to which it was attached to the length of half-an inch, returning to its place within the silver tube when the pressure was withdrawn by the action of a spiral spring. In using it, one cutting edge of the lancet was directed towards the pubes, the other towards the perineum. The advantages of dividing the stricture by this method, as compared with other methods of operating, are, *1st,* that the free opening made in the perinæum prevents all danger from infiltration of urine; *2dly,* that the fore-finger of one hand, being applied to the posterior surface of the stricture, serves as a guide for the lancet, and enables you, with the exercise of a little skill and caution, to make an exact division of the stricture."—P. 67.

In the treatment of urethral stricture with fistula in the perinæum, the author recommends the usual practice of dilating the stricture, as the sole means in the generality of cases necessary; that is, that though the fistula or sinus may in different cases be longer or shorter time in being healed, it will unite and be closed at last, after the urethra has been rendered completely pervious. In the small number of cases in which it seems to resist the healing process, notwithstanding the use of the bougie or sound and complete dilatation, the author recommends that the nitrate of silver be applied to the bottom of the sinus once in three or four days, and that the external orifice be touched lightly once in the week or fortnight with the caustic potash. The reason of this practice is, that, as the internal opening is more inclined to heal than the opening into the urethra, if the whole surface were touched by the nitrate of silver, the superficial parts might heal prematurely; the consequence of which would be another abscess and another escape of matter. But, by the application of the nitrate of silver to the bottom only, the healing process is there commenced, while the application of the caustic potass to the external orifice retards cicatrization there, until the deep-seated parts are firmly united, after which the external parts are also to be healed.

Injuries of the perinæum, penis, and urethra, are followed by anomalous lesions, which have each their own peculiarities, but all of which, nevertheless, agree in the circumstance of causing more or less obstruction to the urethra. Thus, sometimes the penis is thrust into a metallic ring, which, being too small, is not easily removed, and then gives rise to inflammatory swelling and ulceration. Of this accident, Mr Liston details a curious example in the nineteenth volume of this Journal (p. 57); and Sir Benjamin Brodie mentions in the present work (p. 78), another, in which, though the ring was early removed, the ulceration had spread to the *corpus spongiosum* and urethra, and caused much contraction of the latter.

Falls on the perinæum, or being forcibly thrown on the pommel of the saddle in riding, are also causes of injury more or less severe, sometimes with immediate laceration of the urethra and hemorrhage from the *corpus spongiosum*, sometimes with consequent inflammation, ulceration, sloughing, and fistulæ or sinuses.

The author afterwards considers some other diseases of the urethra, obstructing the flow of urine; and in this category are placed ulcers of the glans, healing and forming a contracted cicatrix, and enlargement of one or more mucous follicles, forming a tumour within the canal. The latter, which is a frequent cause of the painful affection denominated chordée, should either be allowed to disappear of its own accord, or be attempted to be discussed by friction with camphorated mercurial ointment.

Irritable bladder is when the patient has too frequent an inclination to void urine, from whatever cause this may proceed. The term, however, Sir Benjamin restricts to those cases only in which the irritability is not the consequence either of inflammation or of organic disease. This irritability the author represents to be most usually the consequence of some considerable change in the chemical qualities of the urine, in consequence either of some derangement in the system at large, or some disorder in the functions of the kidney. The urine, for instance, may contain either an unusual quantity of lithate of ammonia, which is deposited on cooling, mixed with other matter in the form of red or yellow uncrystallized sediment; or it may contain purelithic acid, showing itself in the form of red sand; or it may be alkaline, having the odour of ammonia, and depositing white crystals of the triple phosphate of ammonia and magnesia. The bladder is also irritable, the author might have added, when the urine contains albumen. In other instances, the irritability of bladder is a symptom of disease in, or disease affecting, the nervous system, indicated by attacks of giddiness, probably from disease in the arteries of the brain. In other instances, it is the result, Sir Benjamin says, of mere nervousness, or that state of excitability of the system which is observed in individuals in whom muscles of other parts are unusually irritable. Of all these causes of irritability of the bladder, it is necessary to be aware, in order, at least, if a cure is inadmissible, to avoid doing mischief, or tormenting the patient with useless remedies.

Paralysis of the bladder may be the effect of disease of the brain, as in the last stage of typhous fever or apoplexy, and softening of the brain, or injuries of the brain, or disease or injury of the spinal chord, as in softening and hemorrhage of the spinal chord, injuries of the back, and fractures of the vertebræ, and scrofulous disease of the vertebræ. The result is retention of the urine from inability to contract the bladder The same diminution of nervous influence which takes from the *detrusor* muscle its contractile power, takes from the mucous coat its proper sensibility; and hence the retention causes much less inconvenience and suffering than might be anticipated. When the bladder in this state has become distended to a certain degree, the urine escapes, much as fluid does from a full vessel into which a constant supply is poured. The patient, therefore, seems to void his urine, but he never empties the bladder. This is sometimes overlooked, especially in corpulent individuals; although percussion over the hypogastric region is sufficient to satisfy the observer that there is in that situation an unusual tumour. The best and most certain means of proving the existence of the lesion is the introduction of the catheter, which is followed by the discharge of four or five pounds of urine.

"In some instances," says Sir Benjamin Brodie, "although the bladder has lost its contractile power, the patient is able, nevertheless, to get rid of a portion of its contents, in a stream, by his own natural efforts. This is accomplished by means of the action of the abdominal muscles, but not until the bladder has become enormously distended. Here the urine is expelled at short intervals, slowly, and in small quantity at a time. The patient believes the bladder to be empty, as he probably voids as many ounces of urine as are usually voided in twenty-four hours; and he is surprised to find, on the introduction of the catheter, that it draws off three or four pints, or even a larger quantity. Where this state of things has existed for a considerable time, if the patient dies, and you have the opportunity of instituting a *post mortem* examination, you find the bladder very much dilated, the mucous membrane of a pale colour, and the muscular tunic much attenuated.

"Where the bladder is affected with paralysis, the patient is to be relieved by means of the catheter: and this is easily accomplished; there being no mechanical impediment to the introduction of the instrument. The operation must be repeated at stated intervals, at the same time that you attempt, by suitable remedies, to remove the cause of the paralysis, whatever it may be."—Pp. 96-97.

What is the result if the catheter be not employed? Sir Benjamin states that he has known this accident to be overlooked for months, or even for one or two years. This gives rise to very serious evils. The urine becomes ammoniacal. The kidneys become diseased, secreting first albuminous, and afterwards purulent urine; and the whole inner covering of the urinary organs is very much changed.

In some instances, temporary paralysis of the bladder is the result of a simple nervous state, in which the muscular coat appears to lose its power for a time without any injury either of the brain or the spinal chord, and without mechanical obstruction. This state it seems difficult to explain. Sir Benjamin does not attempt any explanation, and merely details a case illustrating the nature of the disorder. There is strong reason to believe, that, in this class of cases, the bladder undergoes temporary loss of power, in consequence of having become accidentally over-distended, and thereby loses for the time both its natural contractility and its natural sensibility. The catheter must be used regularly to prevent further accumulation and consequent distension, and the patient recovers.

Chronic inflammation of the bladder, though not very frequent, nevertheless takes place occasionally. Its anatomical characters are well described in the following sketch:

> "The mucous membrane is of a dark-red colour, in consequence of its numerous vessels ramifying on its surface, injected with their own blood. As the disease proceeds, the discoloration becomes greater, until, at last, the mucous membrane appears almost black from the turgid state of the vessels; at the same time that it is somewhat thickened and pulpy to the touch. The inflammation extends up the membrane of the ureters; which, in their turn, assume much the same appearance with the bladder itself. The pelvis of each kidney, and the processes of the pelvis, or infundibula, become inflamed also; and these, as well as the ureters, are generally dilated, so as to be more capacious and natural. This dilatation is greatest where there has been a long-continued difficulty in expelling the urine from the bladder; but it exists in other cases also, though in a less degree. In the advanced stage of the disease the inflammation is found to have extended to the glandular structure of the kidneys; and these organs become not only more vascular than natural, but enlarged in size, and of a soft consistence, even approaching in appearance to that of a medullary tumour. Collections of muco-purulent fluid, tinged brown with grumous blood, and offensive to the smell, are sometimes found in the dilated infundibula; at other times there are distinct abscesses in the glandular structure. In cases where the disease is still farther advanced, before the patient dies, we find that the inflammation has extended to the muscular tunic of the bladder, and to the loose cellular membrane by which the bladder is surrounded. Then coagulated albumen is deposited in the cellular texture; not unfrequently small putrid abscesses are formed in it; and sometimes it is found after death in a state of slough, or approaching to it. Occasionally, but rarely, ulceration takes place on the inner surface of the bladder, and sometimes to a very great extent."—Pp. 103–104.

This process is attended at first with pain previous to making water, and also while the urine flows; and the urine deposits as it cools thick tenacious grayish mucus, which adheres to the bottom of the vessel, and which is sometimes tinged with blood. As the disease advances, the quantity of mucus deposited increases, the irritability of the bladder is also increased, the painful micturition becomes more constant and urgent, and the urine assumes a brownish colour, and exhales an offensive ammoniacal odour, and, indeed, we have sometimes found the person of the patient exhaling an offensive odour of the same kind. The extension of the inflammation to the glandular structure of the kidneys is indicated by the accession of symptoms still more serious. The patient has fits of shivering; is sick and vomits, is very feeble and loses flesh rapidly; the extremities become cold; the pulse irregular and intermitting; the tongue is brown; he is tormented with constant thirst; the countenance becomes ghastly and hippocratic; and death speedily follows, not unfrequently preceded by coma.

It is important for the practitioner to observe that the mucus discharged is highly alkaline, turning turmeric paper instantly brown, while the urine may still be acid. Afterwards, however, when the mucus is abundant, it renders the urine alkaline; and then the latter deposits calculous matter composed of phosphate of lime in small masses of the consistence of recently made mortar. Sir Benjamin thinks that this circumstance of the inflamed surface of the bladder secreting viscid mucus only when the inflamed surface of the urethra secretes purulent matter, receives some explanation from the researches of Dr Babington, which show that the purulent matter of a common abscess assumes the characters of mucus on the addition of an alkali.

The treatment recommended consists in observing the horizontal position, the internal use of opium, and other sedative narcotics, small doses of alkalies combined with light bitters, given cautiously, decoction of *pareira,* and injections ether of tepid water, sedative fluids, or nitric acid.

On the internal use of pareira the following observations ought to be read with considerable interest.

> " I have seen much more good done by a very old medicine, which has been long ignominiously, but unjustly, expelled from the Pharmacopœia of the College of Physicians, namely, the root of the *Pareira brava*; and with regard to this, I am satisfied that it has a great influence over the disease which is now under our consideration, lessening very materially the secretion of the ropy mucus, which is in itself a very great evil, and, I believe, diminishing the inflammation of the bladder also. It may be exhibited in the following manner:—Take half-an ounce of the root of the *Pareira brava,* add three pints of water, let it simmer gently near the fire, until reduced to one pint. The patient is to drink from eight to twelve ounces of this decoction daily. If so large a quantity of liquid should be offensive to the patient's stomach, he may take the extract of *Pareira brava* instead, twenty-five or thirty grains being equal to half-a pint of the decoction. You may add to it moderate doses of the tincture of hyoscyamus; and in those cases in which there is a deposit of the phosphates, you may also add some of the muriatic or nitric acid."—Pp. 108–109.

Local applications in the form of injection he allows only to be admissible after the severity of the symptoms has considerably abated. When there is much inflammation the mildest injections irritate. They are especially to be avoided when the mucus deposited is highly tinged with blood. When the symptoms have abated sensibly, the injection of tepid water or decoction of poppies is often beneficial. The fluid is introduced through an elastic gum catheter, to which a small syringe has been attached. Not more than one ounce or one ounce and a-half ought to be introduced at a time, and it should be allowed to remain in the bladder about thirty or forty seconds. This operation may be repeated according to its effects, once or twice in twenty-four hours.

At a more advanced stage, when the intensity of the symptoms is still further abated, the remedy which the author recommends is nitric acid as an injection. The mucus deposited should be entirely free from all admixture of blood, in order to justify the use of this remedy. The administration of the remedy requires precautions and conditions which will be understood from the following extract:

"At first the proportion ought to be not more than that of one minim of the concentrated, or ten minims of the diluted nitric acid, to two ounces of distilled water; but afterwards this proportion may be doubled. I do not say that it should never be increased still further, but I have observed, that for the most part injections, which are stronger than this, are not only not useful but actually prejudicial. In having recourse to this mode of treatment, it is better to wash out the bladder first with a little tepid water; then to inject the acid solution, allowing it to remain for not more than thirty seconds in the bladder. At first the operation should not be repeated oftener than once in every two days; afterwards it may be repeated once daily, but never more frequently than this. If the urine drawn off by the catheter be tinged with blood, the injection should be deferred to the following day; and if the injection be at any time followed by pain, and other symptoms indicating an increase of inflammation, it ought not to be had recourse to again until these have subsided.

"I was first led to adopt the use of injections of nitric acid in the year 1826; and from the experience which I have now had of them, I do not hesitate to say, that, if the precautions which I have suggested be properly observed, they will be found to form a valuable addition to our stock of remedies to be employed in these cases. They are useful not only where the chronic inflammation is the primary disease, but also where it occurs as a secondary affection, the result of a calculus in the bladder, or of a chronic enlargement of the prostate gland."—Pp. 111-112.

Of blood-letting he disapproves as not suited to this complaint, and not exercising much influence over it. The disease is, indeed, so uniformly connected with an enfeebled state of the system, that the patient requires rather that the bodily powers be supported than reduced by depletion.

The bladder is liable to present various phenomena of disease, the true causes of which are in truth not seated in that organ, but in the kidneys. Thus calculi in the kidneys may produce not symptoms seated in or referred to these glands, but symptoms which are usually regarded as indicating the presence of disease in the bladder. Thus the bladder becomes more or less, sometimes very highly irritable, and cannot retain, perhaps, above one ounce or one ounce and a half of urine. The patient has also pain in making water, extending along the course of the urethra. The urine is pale, semi-opaque, and probably albuminous. In such cases no disease is found either in the urethra or in the bladder, but the kidneys may be of a deep dark colour, from excessive vascularity, soft and lacerable, and sometimes the kidneys contain small serous cysts. Sir Benjamin Brodie gives in illustration of this principle several cases, and then draws the following general conclusions.

"What has been now stated seems to afford sufficient evidence as to the existence of symptoms referred to the bladder and urethra in some cases of disease in the kidney. But, with my present experience, I am led to this further conclusion, that a very large proportion of the cases, which have usually been confounded together, under the general appellation of irritable bladder, are rarely of this description; and that in many cases, in which the bladder is actually diseased, it was not so in the first instance, the disease in the bladder being altogether a secondary affection, which would never have existed if there had not been a previous disease in the kidneys.

"But nothing is more common than to meet with disease in the kidney in the examination of the body after death, where there had been no complaints as to the bladder and urethra during life; and in many living persons there are indubitable signs of the kidneys being diseased, while the functions of the bladder and urethra are not in the slightest degree disturbed. It cannot be supposed that it is merely from a caprice of nature that one organ should sometimes sympathise, and sometimes not, with the diseases of another; and the question therefore arises, in what particular cases of renal disease is it that the secondary affections of the bladder are liable to occur?

"I have already explained, that where the urine is overloaded with acid, showing itself in the form of lithate of ammonia, or brown or red sand, or where being alkaline it deposits crystals of the triple phosphate of ammonia and magnesia, it acts as a stimulus to the parts with which it comes in contact, and that an irritable state of the bladder is the consequence. But there is no reason to doubt that other unhealthy secretions of urine may produce the same result; and I am much inclined to believe that such is the real explanation of the affection of the bladder in the cases which are now under our consideration. In such of them as have fallen under my observation, the urine has been always altered from its healthy condition, and its sensible qualities may be described as follows:—There is usually a copious secretion, the specific gravity being below the ordinary standard. But there is some variety in this respect; and I have known the specific gravity to be as high as 1·030. When tested with litmus-paper, it is generally found to be slightly acid; but occasionally it is alkaline; or it is sometimes alkaline and sometimes acid; and, as I shall explain hereafter, the disposition in it to become alkaline increases as the disease advances. When first voided the secretion is of a pale yellow colour, opaque and turbid; sometimes having minute flakes of lymph floating in it. On the addition of nitric acid, or an exposure to heat, there is an abundant coagulation of albumen. When allowed to remain at rest there is a deposit of opaque matter, and not unfrequently of pus. The urine is always albuminous, but quite different in appearance from that which is secreted in the cases which were first described by Dr Bright, and to which the attention of physicians has been of late years so much directed. The albuminous matter seems to be mechanically suspended, and not intimately blended and assimilated with it; as if the kidney were in a state of chronic inflammation, secreting urine from one set of vessels, and serum, or even pus, from others. Such, probably, is the real nature of the disease when once established, whatever it may have been in its origin; and you will find this view of the case to be confirmed by some facts to which I shall draw your attention presently.

"The great majority of the patients who are thus affected are of the male sex. Many of them seem to have been originally of a feeble, and what is commonly called a scrofulous, constitution. The disease, however, is by no means confined to persons of this description. It may be the result of a calculus long impacted in the kidney. Not unfrequently it follows an attack of gonorrhœa, though I suspect that it may, for the most part, be traced to the treatment employed, rather than to the gonorrhœa itself. I allude to the injudicious exhibition of large doses of copaivi and cubebs, especially of the latter.

"The patient complains of a too frequent inclination to void his urine; the period during which he can retain it varying from a quarter of an hour to an hour. There is a cutting pain referred to the neck of the bladder and urethra as the urine flows, and remaining for some time afterwards: there is a constant sense of uneasiness above the pubes. Sometimes there is a dull, but rarely a severe, pain in one or both loins; at other times there is no pain in the loins whatever, or so little, that the patient scarcely thinks of mentioning it until he is questioned on the subject. In a few instances, masses of lymph, of the consistence and appearance of jelly, are found in the urine, which have evidently descended from the kidney. In one case the patient, who, for two or three years, had had no other symptoms than a too frequent desire to make water, and a deposit of pus in the urine, was suddenly seized with a most severe pain in the groin and testicle, so that I concluded that a renal calculus was making its way down the ureter. Instead of this, however, soon after the pain had suddenly terminated, there was found in the urine a mass of solid substance, resembling fibrin, of a pale-brown colour, of a conical shape, smooth everywhere, except at the larger extremity, where it had an irregular and fringed appearance, as if it had been broken off from a larger mass. From this time he continued to suffer in the same manner, voiding similar masses of solid substance at various intervals, and in one of these attacks he died. His death took place in the country; and I believe that no examination of the body was made afterwards. From the account which I received, however, I was led to conclude that the immediate cause of death had been the retention of one of these masses of fibrin in the ureter.

"As the disease advances the patient becomes feeble and emaciated; his complexion is sallow, and he is liable to attacks of nausea and even of vomiting with a constant sense of languor and listlessness, and indisposition to both mental and bodily exertion. The desire to void the urine is incessant, and the sufferings caused by the accumulation of it in the bladder are more severe. As the bodily health becomes impaired, the disposition to secrete alkaline urine is increased; and this change is the usual precursor of the more urgent symptoms of affection of the bladder which mark the advanced stage of the disease. The urine deposits a large quantity of adhesive alkaline mucus: it is of an offensive ammoniacal odour, scalding the urethra as it flows, and producing a severe and constant pain in the hypogastrium. Even in the origin of the disease blood is sometimes discharged with the urine; but at this later period the disposition to hæmorrhage is increased. In some cases the urine generally is tinged with blood, and other times there is an evacuation of pure blood, adding greatly to the patient's misery, not only in consequence of the clots becoming lodged in the urethra, and obstructing the passage of the urine, but by increasing the debility of an already weakened frame. The pulse becomes small and frequent, the tongue is dry and brown, or red and glossy, with a disposition to aphthæ; there is coldness of the extremities; and these symptoms usually precede the patient's dissolution. But it is otherwise in some instances, the patient dying almost suddenly even in a less advanced stage of his complaint. It would appear that not only in these, but in many other cases of disease of the kidney, the powers of the constitution become so impaired, that an accidental circumstance, which, if the patient were in health, would be productive of no more than a temporary derangement of his system, may be sufficient to extinguish life. I have even known a case in which the introduction of a bougie having been followed by a severe rigor, the usual reaction never took place, and the patient died in consequence.

"I have had several opportunities of examining the morbid appearances after death, where the patient had died in this last stage of the disease, and where the history of the case seemed clearly to prove that the kidney had been the only part affected in the first instance. One or both kidneys are found enlarged in size; unusually vascular; of a dark-red colour; soft and readily torn; the distinction between the cortical and tubular portions being less distinct than under ordinary circumstances. Interspersed throughout this diseased mass there are sometimes small deposits of a yellow substance, apparently unorganized lymph. The membranous capsule adheres more closely to the surrounding parts than to the kidney itself. Sometimes the kidney and ureter are imbedded in a mass of firm organised lymph, which involves all the neighbouring structures. Frequently there are thin membranous bags of various sizes in the cortical substance containing, not urine, but a serous fluid. Abscesses are found in the kidney of various sizes, some of which may have made their way into the pelvis and infundibula. In one case one kidney was of double its natural size, and full of deposits of cheesy matter, resembling that which is found in scrofulous lymphatic glands, varying in quantity from the bulk of a pea to that of a horse-bean. The other was diseased in the same manner, but to a less extent. Sometimes an offensive mixture of purulent matter and urine is found in the pelvis and ureter. Occasionally, but rarely, there are deposits of phosphate of lime adhering to the mamillary processes; more frequently there are similar deposits on the inner surface of the membranous cysts and abscesses. The mucous membrane of the bladder and ureters, in most instances, is every where of a dark-red colour, from excessive vascularity, and exhibits the other appearances which have been already described in the history of inflammation of the mucous membrane. In a few cases, however, the appearance of inflammation is only in patches, and where it exists the mucous membrane is ulcerated. These ulcers occur more especially about the orifice of the ureter, the outer extremity of which is seen making a small nipple-like projection in the centre. If the patient survives this stage of the disease, the ulceration of the mucous membrane extends until it occupies a large portion of the internal surface of the bladder. Nor are these secondary diseases confined to the bladder. I have seen cases in which abscesses and ulcers of the prostate gland were apparently to be referred to the same source."—Pp. 131–137.

The treatment indicated for these cases consists in cupping over the loins, counter-irritation from the loins by blistering, issues, or setons, the internal use of the *aqua potassæ* when the urine is much loaded with lithic acid, decoction of *uva-ursi* or bucku leaves, and tincture of muriate of iron.

More or less enlargement of the prostate gland is one of those multiplied morbid states which take place in advanced life, and contribute either to embitter the remainder of existence, or to bring the individual by successive steps to the tomb. Sir Benjamin Brodie infers that it may be established as a general rule, to which few exceptions are observed, that when the hair becomes grey and scanty, when specks of earthy matter begin to be deposited in the tissues of the arteries, and when the white zone (*gerontoxon* or *arcus senilis*) is formed at the margin of the cornea, at the same period the prostate gland usually, he might say, perhaps, invariably, becomes increased in size. Probably this association is in some degree fanciful. At all events, these different indications of approaching old age make their appearance at periods so variable in different individuals, that it is difficult, if not impossible, to admit that in all cases they imply the same amount of decrepitude and decay. Thus passing over the variable periods at which the hair becomes thin and scanty, we know that specks of earthy matter begin to be deposited in the arteries in some persons so early as the 37th and 40th years; and while in the arteries of some persons there is none seen at the age of 60, in others there is a great deal at 50. Much depends upon the mode of life; for though it is evidently one of the effects of age, the formation of the deposits is greatly under the influence of diet and habits of temperance or intemperance. Thus the deposit appears early and spreads extensively in spirit-drinkers and wine-takers, while in the temperate it is late, and confined to the bifurcations of the vessels.

Again as to the *gerontoxon* or *arcus senilis*, we have seen it appear on the dark-complexioned at 50, and between that age and 60, whereas in other persons we have seen no trace of it even at the 70th year.

The period at which enlargement of the prostate gland takes place is, it appears to us, likely to be subject to similar influences. Naturally, we admit, that it is liable to become enlarged as the individual advances in life; but then this is again under the influence of several different causes; as attacks of inflammation or congestion in early life, habits of frequent and excessive sexual intercourse, and especially if kept up by excess in drinking, and not unfrequently the presence of more or less disease of the heart, or lungs, or both. The large veins of the prostate gland become easily distended by the causes now mentioned, and do not readily unload themselves, and thus induce a permanently vascular state of the gland. Frequent attacks of gonorrhœa, also, by spreading into the ducts, may give rise to inflammation there, to the secretion of purulent matter, and consequent enlargement and distension of these cavities, when the whole gland seems, as it were, to consist of a cluster of abscesses. It appears to be abscesses of this kind that are described by Sir Benjamin Brodie, (p. 160), as occasionally bursting upon the introduction of the catheter. The author allows that suppuration in the ducts is the origin of the abscesses in the greater number of cases. But he thinks it not improbable that suppuration may take place in the cellular membrane external to an enlarged prostate.

In some cases ulceration occurs, and this renders the gland liable to bleed. But hæmorrhage may take place also from excessive vascular congestion.

Enlargement of the prostate gland is further liable to induce secondarily various disorders of the kidneys, which are very unmanageable. Thus the secreting action of the kidneys may be excessively increased so as to secrete large quantities of pale urine, or greatly diminished, or even suspended, so as to cause diminished secretion and ischuria, dilatation of the ureter, pelvis, and *infundibula*, or even inflammation of these parts.

The treatment of the disease and also of its most common effect, retention of urine, is very judiciously explained. Here follows a few of the directions.

"When the retention of urine has taken place suddenly, in consequence of a sudden addition to the bulk of the prostate, the patient may derive advantage from losing blood. He may be bled in the arm, or cupped in the loins; and I have known this in a few cases to be of itself sufficient to enable him to make water. But in the very great majority of cases the retention can be relieved only by the use of the catheter.

"I rarely use any but a gum catheter. It gives you rather more trouble to learn the use of the gum catheter, and to become dexterous in the management of it, than it does to learn the use of the silver catheter. When, however, you have once become familiar with the gum catheter, you will generally prefer it to the other; and there is always this advantage in it, that, when you have succeeded in introducing it into the bladder, it may, if necessary, be allowed to remain there. A gum catheter may be retained in the urethra and bladder with very little inconvenience to the patient, which is not the case with a silver catheter.

"As Sir Everard Home has observed, the gum catheter may be used in two ways; without a wire or stilet, when it is a flexible instrument; or mounted on an iron stilet, in which case it is inflexible. You should be provided with a number of gum catheters, mounted, not on small flexible straight wires, like those usually sold by the instrument makers, but on strong iron stilets, having the curve of a silver catheter. The stilets which belong to the larger gum catheters should have flattened iron handles, resembling that of a common sound. Let your gum catheters be kept thus prepared for a considerable time before they are wanted for use. They will then become fixed in the proper curvature. With the stilet such a catheter is as inflexible as if it were made of silver: without it, it is capable of retaining its shape to a certain extent; yet it is flexible.

"I always begin with passing such an instrument as this first. If the gum catheter without the stilet will enter the bladder, it is so much the better. It gives the patient no pain: it is incapable of lacerating the urethra, or producing hæmorrhage: it may do all that is required; and it can do no harm, even in a rough hand. If you fail in introducing it, the failure will not make it more difficult to pass another instrument afterwards. In difficult cases, indeed, the gum catheter without the stilet will not succeed. You must then use your gum catheter mounted in the way which I have already explained.

"You ought not to use a catheter so large as to give pain; but for the most part you will find one which is large enough to fill the urethra, without stretching it, to be more easy of introduction than a smaller one. A very small catheter approaches to a pointed instrument, and the extremity of it is liable to become entangled in the tumour of the prostate. The stilet ought to be considerably curved. The reason of this is obvious. The tumour which projects into the bladder, and which affords the principal obstruction to the catheter, is situated at the posterior part of the inner orifice of the urethra. A catheter which is slightly curved comes directly in contact with this tumour. In a catheter which is much curved, the point is directed forward towards the pubes, and it avoids the obstruction behind. Always bear in mind, in introducing the catheter, that it is to be used with a light hand. It should be held as it were loosely in the fingers. It will then, in great measure, find its own way, in that direction in which there is the least resistance. If you grasp it firmly, it can go only where you direct it, and it is likely to puncture and lacerate the membrane of the urethra, and the substance of the prostate, and to make a false passage, instead of entering the bladder.

"I generally find that I introduce the catheter best by keeping the handle of it at first close to the left groin of the patient. I pass it as far as possible in this position; then I bring the handle forwards, nearly at a right angle to the pubes, and not elevating it towards the patient's navel. The next thing is to depress the handle, which is to be done gently and slowly, by placing a single finger on it, and pressing it downwards towards the space between the thighs.

"In depressing the handle, you generally find the point of the catheter slide into the bladder, Sometimes, however, this does not happen until you withdraw the stilet; and in the act of doing this, the introduction of the catheter is completed.

"Other artifices are necessary, in difficult cases, to enable the catheter to reach the bladder. It may be useful to bend the point forward as it approaches the prostate, either by means of the finger in the rectum, or by pressure made on the perineum. In many instances, the introduction of the catheter will be best accomplished by taking care, while you depress the handle, to keep the concave surface closely pressed against the arch of the pubes, so that it may turn round it as a centre."—Pp. 174–178.

He very properly adds, "But is impossible to explain to you in words all the minute circumstances which practice and experience will teach you, and on which your success in this manual operation will very much depend."—P. 178.

The account of the urinary deposits and calculi, and the causes on which they depend, is given with great ability and perspicuity; and though, after the full and accurate observations of Dr Prout, they cannot be considered entitled to the merit of novelty, still they are valuable as confirming and illustrating the conclusions drawn by that physician. We shall advert merely to the most important and essential circumstances in this account.

1. It is known that urine contains a considerable quantity of lithic acid united to ammonia, in other words, lithate of ammonia. All acids for which ammonia has a stronger affinity than it has for lithic acid, cause the latter to be precipitated in the form of red sand or crystallized deposit. Hence, whenever, in consequence of indigestion, exposure to cold, or any other disturbing force, acid is generated in the alimentary canal, it has the effect of uniting with the ammonia, and the lithic acid is separated, and deposited in the shape of red crystalline matter. The free use of fermented liquors, especially of those which contain saccharine matter or acids, as punch, champagne, and even much malt liquor, leads to the same result. Sedentary habits, also, under which the action of the stomach, and the energy of the skin become enfeebled, give rise to the same state of the system; and hence it is found that, in persons of these habits, the urine contains much lithic acid, or lithate of ammonia, and the joints begin to be affected with gouty inflammation and the formation of lithate of soda.

Among those classes of society which fare luxuriously, and take little or insufficient exercise, the deposition of red sand takes place chiefly in adults. Among the lower classes, on the contrary, Sir Benjamin observes, the same deposition is usually observed in children, and this phenomenon he ascribes to the unwholesome diet prevalent among these classes, and the little attention paid to the state of the digestive organs.

"It is of great consequence," says Sir Benjamin, "that you should stop the formation of red sand, both because it is in itself a considerable evil, and because, if neglected, it may lead to the formation of a larger concretion in the bladder. You may generally accomplish this object by conveying alkaline remedies into the stomach, such as potass, soda, limewater, ammonia, magnesia. Sometimes one, sometimes another, may be preferable, according to circumstances; and sometimes it may be advisable to give them in combination with each other. If the lithic acid be deposited in small quantity, and the bowels are too much relaxed, (which, however, rarely happens in these cases,) limewater may be useful. In persons of weak bodily powers, who may be supposed to require cordial and stimulating remedies, you may exhibit ammonia. Dr Prout recommends the carbonate of potass in preference to the carbonate of soda, for the following reason:—that the soda, under certain circumstances, will enter into combination with the lithic acid, forming an insoluble salt, as bad as the lithic acid itself; whereas the lithate of potass is perfectly soluble; and if this combination takes place, it will pass off dissolved in the urine. Magnesia, as recommended by Professor Brande, has much to recommend it. Being in itself insoluble, it cannot enter the circulation except it has first become combined with acid in the stomach or intestine; and hence it does not pass out of the system so soon as the alkalies.

"I have mentioned the carbonates of potass, soda, and ammonia, as these agree better with the stomach, and therefore are more proper to be employed than the pure alkalies. The carbonic acid does not interfere with their medicinal effects. There is a remarkable difference in the effects produced on these disorders by these salts, which contain a mineral, and those which contain a vegetable acid. The sulphates, muriates, nitrates, are of no avail; but the tartrate of potass, the tartarized soda, the common saline draught, composed of citric acid and potass, all produce the same effect as the pure alkalies, or as the alkalies combined with carbonic acid. This remarkable circumstance was first noticed by Sir Gilbert Blane. Sir Gilbert has also recommended a very efficient method of exhibiting the carbonate of potass in these cases, by giving it in a saline draught with an excess of alkali."—Pp. 201—202.

The author cautions, nevertheless, against the too liberal and indiscriminate exhibition of alkalis, which are liable, not only to render the urine alkaline, and cause the formation of white sand, the triple phosphate of ammonia and magnesia, but to alter the condition of the blood, render the patient liable to petechiæ, make him perspire too easily, and diminish his physical powers. Magnesia, in such circumstances, is more suitable; but it is requisite, in the administration of that earth, to take care that it do not accumulate in the bowels, or form large concretions.

It is important further to be aware of the period of the digestive process when the urine becomes most acid.

"It is to be further observed, that the time when the urine is most acid, and when the alkalies are most required, is after the principal meal, that is, after dinner. The alkalies are not indeed to be given immediately after dinner, for then they are likely to interfere with digestion; but three or four hours afterwards. In some cases it is better for the patient to defer taking his medicine until he wakes accidentally in the middle of the night. In many instances, a single dose daily, and that at bed-time, is all that is required; while in others the magnesia or alkali should be exhibited in the middle of the day also."—Pp. 203–204.

It cannot be concealed, however, that the use of these alkaline remedies exerts an effect merely palliative and temporary, and does not act on the origin of the disorder. With the view of doing so, the author recommends the employment of purgatives, especially mercurial purgatives, and, when the disease is associated with gout, the wine of meadow-saffron.

These means, however, are still little more than palliative and temporary in their effects. The most effectual remedy of all is, in one word, temperance and moderation in the use of food, and abstinence from all vinous or other fermented liquors. Pure water is the safest and most useful of all drinks, whether prophylactic or curative.

2. Besides the deposit of red sand, the urine is liable to contain another salt, which is deposited in the form of white sand. This is the phosphate of ammonia and magnesia, or the triple phosphate, as it is commonly named. The urine is in this case not acid but alkaline; or, though slightly acid when recently voided, becomes alkaline as it cools, and is covered with a thin iridescent pellicle, which is the triple phosphate. Sir Benjamin Brodie explains the occurrence of this salt after the manner of Dr Prout, who is of opinion that the urea, in certain circumstances, becomes decomposed in the kidneys, and forms ammonia, which combines with the phosphate of magnesia, renders it insoluble, and thus forms the triple salt. Dr Prout had also shown that the same state of the system which disposes the urea of the urine to be decomposed, and form ammonia, leads to the formation of the phosphate of magnesia in greater quantity than natural; and hence proceeds the abundant deposition of white sand, which, in certain circumstances, and in particular states of the system, occurs.

The present author renders to Dr Prout the credit he justly deserves, for having been the first to explain fully the circumstances under which the triple phosphate is generated. While the lithic acid and lithate of ammonia are the result of over-feeding with little exercise, the production of the triple phosphate is the result in some sense of imperfect nutrition, or, at least, imperfect assimilating power, and takes place mostly in persons whose bodily and mental faculties are tasked beyond their powers. It is hence quite incurable by medicine and medical treatment; and no amendment takes place till the patient exerts himself less, till his mind becomes easy, and he takes a proper proportion of sleep and repose from mental and bodily labour. It takes place after the use of courses of mercury, after injuries of the spine or spinal chord, blows or falls on the back or loins, excessive indulgence in the sexual passion, and various morbid states of the interior of the bladder.

3. A third saline substance deposited in certain circumstances is the phosphate of lime. This may occur in consequence of diseased states of the kidney, but is much more likely to take place in consequence of chronic inflammation of the vesical, ureteric, pelvic, and calycine mucous membranes. The mucus which these membranes then secrete is highly alkaline, containing carbonate of soda and phosphate of lime, the former soluble, the latter in-

soluble, and presenting sometimes the aspect of white streaks in the mucus, at other times that of irregularly shaped masses like mortar. When it takes place without the presence of vesical mucus, it assumes the form of a white impalpable powder, which falls like powdered starch to the bottom of the vessel.

"In either of these forms of the disease the phosphate of lime may be generated where there is none of the triple phosphate in the urine, and you will frequently find the urine to be acid when it is first voided, even though it deposits an alkaline mucus. If you wait some time longer putrefaction begins, ammonia is evolved, and the whole is rendered alkaline. The triple phosphate of ammonia and magnesia, and the phosphate of lime, have different origins, and either of them may exist in the urine independent of each other. But it continually happens that you find these two varieties of the phosphates co-existent in the urine; and this combination is probably produced in one of the following ways:—

"1. The primary disease may be a secretion of alkaline urine in the kidneys, and consequent production of the triple phosphate. The alkaline urine is an irritating application to the membranous surfaces with which it comes in contact. If it continues for a certain time, it induces a chronic inflammation of the mucous membrane of the kidneys and ureters, extending to that of the bladder, and the formation of adhesive mucus, containing the phosphate of lime:

"2. In other cases, the chronic inflammation of the mucous membrane of the bladder is the primary disease. This cannot exist long without affecting the constitution. It excites, not inflammatory fever, but a low febrile disturbance of the system, attended with much general debility. Such a state of system is very liable to occasion a secretion of alkaline urine in the kidneys:

"3. In other cases, the secretion of phosphate of lime by the mucous membranes may be a simultaneous effect of the same unhealthy condition of the constitution, which causes the formation of the triple phosphate of ammonia and magnesia in the urine.

"And, in one or other of these ways, it happens that the formation of the triple phosphate, and that of the phosphate of lime, are associated with each other; sometimes one, and sometimes the other, being the original malady."—Pp. 215, 216.

In general the treatment of patients affected with urine containing the triple phosphate requires tonic and nutrient remedies; the internal use of acids, vegetable or mineral, especially nitric acid, sulphate of quinine, sulphate of iron, tincture of muriate of iron, and even the use of such wines as Hock, Moselle, and Chably. Opium is beneficial. The *regimen mentis* is indispensable.

In counteracting the tendency to the deposit of phosphate of lime, it is requisite to diminish the inflammatory state of the vesical mucous membrane, not by depletion, which the author regards as very detrimental, but by removing stricture, by the regular evacuation of the bladder, by the introduction of the elastic gum catheter, rest in the horizontal position, opiate glysters or suppositories, the internal use of *Pareira brava*, and injection of tepid water, and afterwards of water containing a dilute solution of nitric acid.

In the discussion of the chemical and pathological history of renal calculi, we find the author follows very closely the descriptions and distinctions of Dr Prout.

Next comes the subject of calculi in the bladder; the chemical and pathological history of which is delivered with the usual ability of the author. To those, however, who have perused the works of Marcet and Prout, little that is new is presented. The semiography, however, is given with so much judgment that we think our readers will be pleased with seeing it in this place.

"The first thing that will strike you, when you come to study the disease in the living person, is, the different degrees of suffering to which different individuals, and even the same individuals, are subject, in different stages of his complaint.

"The symptoms differ; 1st, According to the size of the stone, the smoothness and roughness of its surface, and its general figure:

"2dly, According to the quality of the urine. Thus, the urine may be unusually acid, or it may be alkaline, and depositing the triple phosphate; and in either case it will be too stimulating for the parts with which it comes in contact, and the symptoms produced by the stone will be thereby aggravated:

"3dly, According to the state of the bladder. Nothing aggravates the symptoms so much as the existence of inflammation of the mucous membrane. This increases the sensibility of the bladder a hundred-fold, and causes a small stone to produce a much greater quantity of distress and pain than a large one produces under ordinary circumstances.

"If the bladder be healthy, a very small stone produces very trifling and, indeed, very equivocal symptoms. The patient has the inclination to make water, induced by a rather smaller quantity of urine in the bladder than under ordinary circumstances. He has a sense of irritation, scarcely amounting to pain, referred to the neck of the bladder, to the urethra, perhaps to the perineum, after the bladder is empty. In one instance, for many months the patient complained of nothing except an occasional pain, and that but trifling, on the inside of one groin, and of the urine being tinged with blood, after riding on horseback. Bloody urine, after any jolting exercise, is a strong indication of a calculus somewhere, either in the bladder or kidney. Where it arises from other causes once, it arises from this cause twenty times. But this symptom is often wanting in the early stage of the disease, while the stone is still small, especially where the patient leads (as often happens) an inactive life. A small stone occasionally falls on the inner orifice of the urethra, while the patient is making water, and thus suddenly impedes or stops the flow of urine. This is one of the most characteristic symptoms of the disease in its origin; but even this is often either wanting, or not observed for a long time.

"As the disease advances, and the stone grows larger, other and more decided symptoms show themselves; which may be thus enumerated:—

"1. A very frequent desire to make water; the impulse to do so being sudden and irresistible, and liable to be induced by the smallest change of position.

"2. Pain referred to a particular point in the glans penis, at the extremity of the urethra; the pain sometimes being described as a severe yet dull pain; at other times compared to the effect of a hot iron applied to the part—that is, what is called a burning pain. This pain is most severe after making water, and on taking exercise, when the stone falls suddenly down on the neck of the bladder.

"This pain in the glans penis is one of the most marked symptoms of the disease. A child who labours under stone in the bladder tells you of it, not in words, but by his actions. He is always pulling the end of the penis, and pinching it with his fingers, even so as to cause the prepuce to become elongated. You often find his fingers having the cuticle soft and sodden (as if they had been soaked in hot water), from the urine which has been imbibed.

"3. The urine is frequently stopped as it flows from the bladder, by the stone falling against the inner orifice of the urethra.

"4. Where there is a calculus even of a moderate size in the bladder, it rarely happens that the urine retains it natural clearness and transparency. A slight cloud is perceptible in it as soon as it begins to cool, and a mucous deposit takes place afterwards."—Pp. 261–263.

"At first his general health is unaffected; but at last the health begins to suffer, the urine becomes alkaline, and the triple phosphate is deposited on the original stone. The growth of a stone composed of the phosphate is much more rapid than that of one composed of the lithic acid. But this is not the only cause of the aggravation of the symptoms which now takes place. The alkaline urine is more stimulating to the bladder than healthy urine, and this is one source of the patient's increased sufferings. Another reason is, that that state of the general health which causes the alkaline urine to be secreted by the kidney, is attended with an increased or morbid sensibility of the nervous system generally.

"As the disease advances, the continued irritation kept up by the stone induces inflammation of the mucous membrane of the bladder. There is now a still further augmentation of the patient's sufferings. The stone is rolling about in an inflamed bladder; and you know how the sensibility of every organ in the body is increased by inflammation. The existence of this state of things is indicated by greater pain, and by the desire to make water being almost constant; by the urine being voided offensive to the smell, soon becoming putrid and ammoniacal, and depositing the usual thick, tenacious mucus, streaked with blood. This mucus, as I have already explained to you, leads to the formation of the fusible calculus; and all that I have now stated will enable you to understand that different kinds of calculus are attended with different degrees of suffering. A patient with a simple lithic acid calculus suffers less than one with a calculus composed externally of the triple phosphate; and the latter less than a patient with a fusible calculus. The oxalate of lime or mulberry calculus, on the whole, occasions more distress than the lithic acid calculus; probably on account of the irregularities which so frequently exist on the surface of the former; but it occasions less distress than the calculi composed of the phosphates."—Pp. 264–265.

On the different modes of removing calculi from the urethra and from the bladder it is needless to dwell. We recommend the careful perusal of the observations and instructions of Sir Benjamin to the particular attention of our readers.

The last subject treated by the author in the present volume is that of lithotrity, and its advantages or disadvantages when compared with lithotomy. This subject Sir Benjamin has considered with great care and attention, and has drawn several conclusions which deserve the particular attention of all those who are desirous to practise the operation with any degree of success. On the minds of those surgeons the following general observations should be deeply impressed.

"In boys under the age of puberty lithotomy is so simple, and so generally successful, that we ought to hesitate before we abandon it for any other kind of operation.

"There is also a manifest objection to lithotrity in these cases, on account of the small size of the urethra, which is such that it would not admit of the introduction of instruments of sufficient strength to crush a calculus of more than moderate dimensions.

"In the female sex the extraction of a calculus from the bladder by the ordinary methods is attended with little danger; while the operation of crushing it is rendered difficult, in consequence of the short and wide urethra allowing the water which has been injected into the bladder to escape by the side of the lithotrity-forceps before the operation is completed.

"In cases in which the calculus has attained a very large size, it is often difficult to seize it with the lithotrity-forceps; the operation of crushing requires to be repeated a great number of times, so that many weeks may elapse before the cure is accomplished; a larger quantity of fragments is left in the bladder, of which the necessary consequence is a great liability to inflammation of the mucous membrane; and of course the inconvenience produced by the passage of the fragments along the urethra is multiplied, as compared with what happens when the calculus is smaller. These circumstances form a sufficient objection to the operation of lithotrity in these cases. It is true, that they are unfavourable cases for lithotomy also; but I have little doubt that the latter method is the safer of the two. It admits of a question, whether, in such cases, the two modes of operating may not be advantageously combined, the calculus being crushed into three or four pieces first, and extracted by the usual incision afterwards.

"The operation of lithotrity, as I have already observed, is not well adapted to those cases of enlargement of the prostate gland, in which the patient is enabled to empty the bladder by his own efforts, unless the calculus be of a small size, so that there may be no great difficulty in washing the minute fragments, into which it has been crushed, out of the bladder through a large catheter.

"There is also another objection to the operation in some cases of enlargement of the prostate, namely, that the tumour which projects from it into the cavity of the bladder, makes it difficult to elevate the handle of the forceps sufficiently to seize the stone easily in the usual manner.

"I have described the dangers which attend on lithotomy in those cases in which a calculus of the bladder is complicated with disease of the kidney. One of the principal of these is connected with the loss of blood, which that operation must always occasion to some extent, and not unfrequently to a great extent, in spite of the best exertions of the surgeon to prevent it. I have no doubt that, in such cases, the operation of crushing is the safest method of proceeding; but a small shock to the system will sometimes destroy the life of a patient who labours under renal disease, and it will be often more prudent to trust to the means which we possess of palliating his sufferings, than to run the risk of shortening his life in the endeavour to obtain a cure."—Pp. 375–377.

"With the exception of such cases as those which have been enumerated, there are few to which this method of treatment may not be advantageously applied. It may be said that the exceptions are numerous; but they are the result chiefly of delay. If a patient seeks the assistance of a competent surgeon within six or even twelve months after a calculus has descended from the kidney into the bladder, the urine having remained acid, it will rarely happen that he may not obtain a cure by a single operation, and with so small an amount of danger that it need scarcely enter into his calculations. As time advances, the facility with which he can be relieved diminishes, and after the lapse of two or three years, especially if the urine has become alkaline, it is probable that the calculus will have attained such a size as to render the old operation preferable, and that the access of disease in the bladder or kidneys may render any operation hazardous. It would be absurd to say, and it would be unreasonable of human-kind to expect, that an operation which has for its object to relieve them of a disease so terrible as that of a stone in the bladder, can be always free from inconvenience, and difficulty and danger. Nevertheless, from what experience I have had, I am satisfied that the operation of lithotrity, if had recourse to only in proper cases, is not only much more successful than that of lithotomy, but that it is liable to fewer objections than almost any other of the principal operations of surgery."—P. 379.

The truth, the justice, and the value of these observations every one must admit. They evince, indeed at once the experienced surgeon and the dispassionate inquirer. The greatest objection against operations is their indiscriminate application to cases of every description; and the great advantage which one surgeon possesses over another, consists in the discretion and judgment, by which he distinguishes those cases which admit of any given mode of operation from those which do not. This talent the present author remarkably evinces throughout his whole work, and especially in relation to the subject now under consideration.

Art. II.—*Traité des Neuralgies, ou Affections Douloureuses des Nerfs.* Par F. L. J. Valleix, Medecin du Bureau central des Hopitaux et Hospices Civils de Paris, &c. 8vo. Paris, 1841. Pp. 719.

Much as pathology has done for elucidating the true nature of many diseases,—much as it has done for the elucidation of the diseases of the nervous centres, it is astonishing how little it has effected for the diseases of the nervous cords. The consequence has been, that these diseases have been hitherto treated without much system; and that theories have been suggested to account for the symptoms and the *modus operandi* of therapeutic agents, which a little examination showed to be founded in error, not on observation. The excellent dissertation of Mr Swan, indeed, of which an account is given in our seventeenth volume, is almost the only systematic treatise on the subject in the English language. Of this a new and improved edition appeared in 1834. Along with this may be mentioned the treatise of Descot, which appeared at Paris in 1825, and which certainly contains much curious and useful information. It must, nevertheless, be allowed that, on the pathology as well as the therapeutics of these disorders, our knowledge is neither precise nor extensive.

But it is not to be so much wondered at that we know not something more relative to the pathology of diseases of the nervous cords, as we are almost equally ignorant of the physiology of these important organs. We know not yet with certainty how sensations are conveyed from distant parts to the nervous centres, nor yet what agent it is which, by being transmitted along the nervous cord, gives rise to voluntary and involuntary motion. But though thus ignorant of the physiology of the nervous system, it does not on that account follow that we must wait till this point is cleared up, before we proceed to endeavour to ascertain whether a nervous cord which has been the seat of painful sensations during life, does not present certain and invariable changes of structure. It may happen in this case as in other cases, that pathology may be the means of discovering the true physiology of nervous agency. It is requisite, then, that facts be carefully collected, to see whether any general conclusions can be drawn which will throw light on the subject. This M. Valleix has endeavoured to do in the present work. And several of the conclusions at which he has arrived, differing though they do from those of former inquirers, seem to be the result of a careful and strict deduction from the facts he has collected.

From the paucity of systematic treatises on neuralgic diseases, it would appear that many different affections have been classed along with them, or mistaken for them; whilst others, truly neuralgic, have been overlooked or regarded as of another nature. It was to supply this deficiency that M. Valleix, already favourably known to the profession as the author of an able treatise on the neuralgic affections of the chest, brought out the present work, —a work which may be described as a systematic and practical monograph of the neuralgic affections of the nerves of animal life. Bichat, in his Anatomie Generale, appears to have been the first who distinctly pointed out the fact,—previously, however, hinted at by a few older writers,—that "the neuralgias of the nervous system of organic life have nothing in common with tic-douloureux, sciatica, and the other neuralgic affections of the nervous system of animal life." Notwithstanding this, even the very best writers on neuralgic affections have continued to confound the one disease with the other. Much valuable information has, however, been communicated by some writers who have more especially directed their attention to the neuralgic affections of the nerves of organic life; and the treatises of Lobstein, Teale, Pritchard, and a few others may be referred to, as works containing much valuable and useful information on this head. M. Valleix's treatise is confined strictly to the neuralgic affections of the nerves of animal life. It cannot be inferred from any thing which he states in his work that he was aware of Bichat's division of neuralgias, neither does he quote the researches of Lobstein, which confirm Bichat's conclusion. He appears to have arrived, however, at the very same result, in consequence of his own extended researches; in fact, so far as we have been able to notice, he nowhere even hints at this division. Yet, from the beginning to the end of his work, he treats of all the known neuralgic affections of the nerves of animal life, and of them alone. His work, then, whilst it is a valuable contribution to science, singularly corroborates the enlightened views of the illustrious Bichat.

As a necessary preliminary, the author defines neuralgia to consist in "a more or less acute pain, having its seat in the branches of a nerve, but scattered over dispersed points, which form true painful centres, from which, at irregular intervals, proceed darting pains of the same nature, and over which pressure excites more or less pain." The work is divided into eight chapters; the different forms of neuralgia being classified in a natural arrangement, according to the class of nerves affected, viz. 1. Trifacial neuralgia.

2. Cervico-occipital neuralgia. 3. Cervico-brachial neuralgia. 4. Dorso-intercostal neuralgia. 5. Lumbo-abdominal neuralgia. 6. Crural neuralgia. 7. Femoro-popliteal, or sciatic neuralgia; and 8. General remarks on neuralgic affections. Each chapter, again, is divided into a number of sections and subsections, treating of the history of the disease, anatomy of the parts involved, general description of disease, symptoms, progress, duration, termination, liability to relapse, pathology, causes, diagnosis, prognosis, and treatment.

Trifacial neuralgia, or neuralgic pain affecting the trifacial nerve, forms the subject of the author's first chapter. He commences by giving a short historical account of the writers on this disease, with the views held by each of these relative to its site and nature. It is matter of regret that a better acquaintance with the writers of this country is not shown by French authors; with the exception of Fothergill, Halliday, and Hutchison, no other English writer is noticed by the author as having described the disease. In detailing the anatomical relations of the trifacial nerve, its distribution and connection with other nervous branches, notice is taken of its resemblance to the spinal nerves, in consequence of a ganglion being found on one portion of the filaments which arise from the brain, (Gasserian ganglion), but not on the rest. Considerable stress is laid on the minute subdivision and particular distribution of each of the nervous branches, more especially to those points, where, from being more deeply seated, the branch bends up to join the skin. It is given as a reason for being thus minute, that it is at particular points the fixed pain attending neuralgia always resides, and that from these points the lancinating pain proceeds as from a nervous centre; and these fixed points are those which the author so minutely describes. They will be more minutely alluded to afterwards, when treating of neuralgia in general.

From the researches of the author, neuralgia of the face is more common than all other forms, excepting dorso-intercostal neuralgia and sciatica. It seems to be very rare in children, and seldom occurs in persons under 20 years old. From 20 to 60 years of age is its most common period of attack, and it does not appear that, during that long period of life, any particular age is less liable to it than another. From the cases which have been collected it seems that women are rather more subject to facial neuralgia than men, and in slightly greater proportion before the age of 30 than above that age. No particular constitution or temperament seems exempt from the complaint. In women menstruation is generally irregular; and this affection has even been seen to follow a sudden suppression of the menses. It appears not to be regulated in its attacks by any particular diet or regimen, by excess, profession, pursuits, or hereditary predisposition; neither does it seem to originate in persons tainted with syphilis. It is often attributed to exposure to cold, and is most common during the cold months of the year, it has also been traced to the irritation produced by a carious tooth; but of this, M. Valleix has never seen a case.

The particular seat of the affection varies. Most commonly the neuralgic pains affect all the three branches of the fifth pair of nerves, but if only one branch is affected, it is most commonly the lower maxillary.

The pain attending this form of neuralgia is of two kinds; one fixed, constant, weighty, and excited by pressure; the other lancinating, and felt only occasionally. The first is not fouud extending over the whole nerve, but over scattered points, at which places pain is always excited on pressure, but not by pressing on the continuation of the same nerve at half a line's distance from the painful point. These points M. Valleix finds to be constant in their seat; hence, the great pains he has taken to point out the minute distribution of the branches of the nerve. Besides these two kinds of pain various other uneasy sensations are experienced in the affected part, as burning heat, tearing sensation, feeling of tension, formication, tingling, &c. By their return at regular or irregular hours, these uneasy feelings and darting pains form regular paroxysms. These affections of the trifacial nerve are occasionally attended with various disorders of the parts to which the branches of the nerves are distributed. Thus, there is sometimes present an injected and watery eye, or photobia, or an increased heat and discharge of mucus from the nostril of the affected side, or ringing in the ears, pain in the bulbs of the hairs, or toothache. In a few cases more severe symptoms are met with, as convulsions, contortions, spasms, or tremulous motions of the muscles of the face. But no authentic case has yet been published where atrophy or hypertrophy of the face has resulted from the continuance of the affection. It frequently happens that neuralgic pains also occur in other parts of the body, as in the back of the head or neck, the loins, the chest, or along the sciatic nerve. The respiratory functions seemed to be unaffected in trifacial neuralgia, but in many persons the digestive functions are deranged; but this M. Valleix attributes to the remedies employed for the cure of the neuralgia, not to the neuralgia itself.

The disease forms slowly; gradually, by its continuance, increasing in severity. The periods of intermission, or relief from pain, are quite irregular, and even where there is marked periodicity, the failure of sulphate of quinine in removing the complaint, shows that it has nothing of the nature of intermittent fever. The exacerbations occur equally during the night as during the day, and seem to be brought on by a sensible lowering of the temperature more frequently than from any other cause.

The duration of the disease is very variable, and when it yields it disappears as slowly as it had formed. It never ends fatally, but occasionally passes into a chronic state, when it resists all curative means. Relapses occur in about a-half of the cases.

Nothing is yet known regarding the anatomical lesions, or pathological conditions giving rise to this neuralgic affection; from what has been been written on the subject, and his own researches, the author concludes that it ought to be regarded in the meantime as a lesion of the function of which we know not yet the organic cause.

It is barely possible to confound this disease with any other of the parts where it occurs. The general redness and diffusion of the pain serve to distinguish inflammation of the cheek. Toothache may be recognized by the contact of a hard body with the diseased tooth giving rise to the stings of pain. Inflammation of the maxillary sinus may be distinguished from it by the character of the pain, which is not lancinating, and by the previous inflammation of the nasal cavities. From inflammation of the articulation of the jaw, by the pain in this being produced by the movements of the jaw, and freedom from pain when the jaw is at rest. No undoubted case of neuralgia of the motor nerve of the face has been recorded; those which have been termed such appear to have belonged to M. Valleix's second class, viz. neuralgia of the occipito-cervical nerves. Megrim and *clavus hystericus* are regarded as varieties of trifacial neuralgia.

In the treatment of this affection the sulphate of quinine has been very generally employed where the symptoms showed any tendency to a periodic return; without, however, being able to give a reason for the difference, it has failed in more than one-half of the cases in which it was used. The most marked success appears to have followed the use of electricity in the hands of M. Magendie and a few others, but M. Valleix has not succeeded in obtaining the same beneficial results. Section of the nerve, cauterization, &c. have sometimes succeeded in giving relief, but ought never to be had recourse to till all other means fail. The application of blisters, either by themselves, or dressed with various narcotics, have been occasionally successful; in most cases, however, the benefit seems to have been derived from the simple blister itself, and not from the narcotic substance sprinkled over it, and flying blisters in M. Valleix's hands have been followed by favourable effects. The subcarbonate of iron is said not to have in France the same beneficial results sometimes derived from its use in this country. Narcotics have never removed the disease; and blood-letting has been always useless, often hurtful. Much benefit appears to have been derived from pills composed of equal parts of hyoscyamus, valerian, and oxide of zinc, given in increasing doses from one to thirty per day.

As relapses are common, the patient is directed to defend him self from cold, from cold currents of air, and to keep the head warmly clothed.

Such are the general remarks made by M. Valleix on this form of neuralgia, and the following 188 pages are devoted to more extended details of the disease, treated in the very same order as that above noticed, viz. the seat of the disease, varieties, &c., progress, duration, termination, and liability to relapse, pathology of the disease, causes, diagnosis, prognosis, and treatment. Each of these sections in this extended view is illustrated by numerous, and in general well-selected cases, exhibiting the characteristic points to which the author wishes to direct attention. The subsections treating of the particular and minute division of the neuralgic affections of this nerve are well worthy of careful perusal. He shows that, though neuralgia may affect particular points of every one of the numerous branches of the trifacial nerve, that there is rarely more than two or three points affected at one and the same time. Thus in fourteen cases witnessed by himself M. Valleix found that in seven cases only three painful spots existed on different branches, in four cases two spots only were affected, and in three cases only one spot. In another table of cases related by different authors, he states that three branches were affected in seventeen cases; two branches in seven cases, and one branch in seven cases. Where one branch only was affected, it was in most cases the inferior maxillary or some of its subdivisions. In endeavouring to ascertain which of the three great branches of the trifacial nerve was most commonly primarily affected, it was ascertained that in no case did the pain ever originate in the superiory maxillary branch. In eleven out of thirteen cases the pain was first felt at or near the supra-orbital foramen, on the side of the nose, or in the upper eyelid, in the other two cases it appeared first in the lower maxillary branch, where it remained fixed. Of nine cases where the particulars are related by other authors, the pain originated in five in one of the ophthalmic branches, and in four in the lower maxillary nerve, where it remained fixed, as in the cases noticed by M Valleix.

M. Valleix has added nothing to our knowledge of the pathology of this affection. From the circumstance, however, of the pain only recurring at intervals, not being relieved, but rather aggravated by depletory measures, and in general no change of structure being observed on dissection, he infers that it is not an inflammatory affection, and that in those very few cases in which some thickening of the nervous filament has been met with, that this was to be attributed to the irritation excited by the long continuance of the pain.

The second chapter treats of the second variety of neuralgic affection—*occipito-cervical neuralgia.* This form of neuralgia appears to have been overlooked by almost all writers,—André and

Berard being among the first authors who noticed its occurrence. The nervous branches affected in this form of neuralgia are those of the four upper cervical pairs of nerves. M. Valleix describes very minutely the particular distribution, and various plexuses which these nerves form, and directs especial attention to the superficial branch of the second pair of cervical nerves, which is larger than the others, and becoming subcutaneous, is distributed over the occipital and upper cervical region. It is the plexuses and filaments of this branch which are principally affected in occipito-cervical neuralgia.

Before proceeding to the general detail of the symptoms, &c. of the disease, M. Valleix gives the minute details of eight cases, describing the symptoms and treatment pursued in each ; and not the least instructive portion of these details consists in his valuable remarks on each case. For these remarks, as well as for the cases themselves, we must refer to the work itself.

Cervico-occipital neuralgia occasionally attacks both sides at once, more commonly, however, one side only is affected, and in the cases detailed, seems to have been more commonly on the left than on the right side. As in trifacial neuralgia, the fixed weighty contusive pain is found to occupy certain spots, which it does not leave till the disease be removed. At intervals of longer or shorter duration, shooting or thrilling pains and other painful sensations are experienced. These lancinating pains return in paroxysms, almost always arising from a certain fixed point below the occiput, at a short distance from the first cervical vertebra, and stretching up to the upper parts of the cranium. In a few cases the lancinating pain also stretches towards the face, at other times towards the shoulder. The point from which these pains start is one of the best diagnostic marks of this form of the disease. Five points are mentioned which are the seat of the fixed dragging pain, and also the centres from which the lancinating thrills originate. The presence and exact position of these is most easily ascertained by pressure over the occipito-cervical regions by the tip of the finger, when, by care, the painful spots may easily be found out. These painful spots, just as occurred in trifacial neuralgia, are found to be situated at the point of emergence of some of the chief branches of the cervical plexus, where the nerve becomes superficial. The most constantly painful spot is, therefore, that at which the occipital nerve emerges, situate in the space between the mastoid process and the first cervical vertebra. When one of these painful points from which the lancinating pains proceed is situate over the mastoid process, and stretches below the lobe of the ear, the disease has been mistaken for neuralgia of the seventh pair of nerves. The other points over which fixed painful spots occur are, in the space between the anterior margin of the Trapezius and the posterior margin of the sterno-cleido mastoid muscle, over the temporal region, and over the concha of the ear. It is from these different points that the paroxysms of lancinating pain dart, and stretch to the forehead, occiput, surface of the cranium, neck, shoulder, &c. The pain in every case appears to follow strictly the distribution of the nerve. Though the pain appears sometimes to strike in the direction of some of the branches of the motor nerve of the face, M. Valleix does not think the neuralgic affection is ever seated in them, and he has never been able to trace, on pressure with the tip of the finger, any fixed painful spot on any of its branches.

As in other neuralgic cases, affections of the same nature sometimes occur in other nerves at the same time. In general the disease is uncomplicated with any other affection. This variety of neuralgia does not differ from others either in its progress, duration, termination, or causes which give rise to it. No difficulty ought to exist as to its diagnosis; the fixed nature of the pain over particular spots, and the paroxysms of lancinating pain stretching from these spots as centres, at irregular intervals, sufficiently indicate its nature.

Nothing new is stated as to the mode of treating this form of neuralgia, the same rules applying to it as to the trifacial neuralgia. Of all the means employed by M. Valleix, the flying blisters were followed by the most constant success. The addition of quinine succeeded in relieving one case in which the paroxysms returned at regular intervals.

Cervico-brachial neuralgia forms the subject of M. Valleix's third chapter. After a very short historical introduction, in which he merely cites Celsus, Cotugno, and Chaussier, as having noticed this form of neuralgia, the author proceeds to describe the nerves which are implicated in this variety of the disease. These are the four lowest pairs of cervical nerves, and the first pair of dorsal nerves—those which combine to form the brachial plexus. In the minute anatomical details which are given of these nerves, attention is particularly directed to the points where any of the branches, from being deep-seated, become superficial; as it is at these spots that the fixed weighty pain is always experienced; and from these spots that the lancinating or thrilling paroxysms of pain arise which form the peculiar features of neuralgic affections. This is the most important fact which M. Valleix brings forward in his present work, and is one which, from its general applicability to all true neuralgic affections, is likely to render them of much more easy diagnosis.

Eight cases of the varieties of this neuralgic affection are minutely detailed, with critical notices of the symptoms and treatment of each case. In them it is seen that though, according to the statement of the patient, or a hurried examination, the pain was often thought to pervade the whole course of the nerve, the constant and fixed gnawing pain was always ascertained to be stationary at one or other of those spots where the nervous branch became superficial, and emanated from this point as from a nervous centre, in paroxysms of lancinating or acute thrilling pain, to other parts to which branches of the same nerve were distributed. The detail of the cases, and the remarks on each, would repay the labour of an attentive perusal.

Cervico-brachial neuralgia rarely or never occurs on both sides at once, and is more common on the left side of the body than on the right. The spots where the fixed painful sensations are experienced are extremely numerous, and occur at certain points over the whole surface, supplied with nerves from the brachial plexus. These points are easily discovered by the effects of pressing them with the point of the finger, the pain being instantly greatly aggravated, whilst over the nervous cord, or each side of this spot, no uneasiness is experienced. In this form of neuralgia these painful spots are frequently very numerous. The ulnar nerve, and its branches, is unquestionably the one most frequently affected, but in all cases, during the paroxysm of pain, lancinating pains are occasionally felt in different parts of the body, but especially over the chest.

In this form of neuralgia the digestive organs are never affected in proportion to the severity of the paroxysms, nor appear to be connected with it. Neither are the respiratory functions implicated; in one case only there were precordial pains and attacks of suffocation, attributable to a complication of this form of neuralgia, with that form of angina depending on neuralgic affection of the dorso-intercostal nerves.

The causes of this form of neuralgia appear to be the same as those of the forms above noticed. In some cases, however, it would seem that local injuries, or even tumours on the nerve, give rise to true neuralgic symptoms. M. Valleix describes one case in which a burn of the thumb appeared to be the exciting cause, another which originated from a contusion of the ulnar nerve, and a third, in which symptoms imitating neuralgia seemed to depend on the presence of a tumour of the ulnar nerve. No notice is taken of those cases of neuralgic pains occasionally remarked to occur after blood-letting, nor of that very singular affection so well described by Mr William Wood, as the subcutaneous nervous tubercle; and yet the symptoms attending both these diseases present in every respect the diagnostic marks held by the author to be characteristic of the true neuralgic affection.

Rheumatism would seem to be, on the whole, the disease most apt to be confounded with cervico-brachial neuralgia; but, by attending to the characteristic marks of neuralgic affections, especially the confinement of the pain to a fixed spot, till a paroxysm comes on, and the darting of the lancinating pains in the course of the nerves, the disease may be easily diagnosticated.

The treatment does not differ from that required for the other neuralgic affections. According to the author's experience, flying blisters with quinine or iron appear to have had the most marked success.

Dorso-intercostal Neuralgia is the next variety noticed. In the historical notice of the writers who have noticed this affection, or described it under a different name, without recognizing its nature, the works of British writers are largely quoted. From this detail it would appear that this variety of neuralgic disease has been described by authors as "spinal disease," "a particular affection of the nerves of the spinal marrow," "neuralgia depending on irritation of the spinal marrow," "spinal irritation," "functional affection of the spinal cord," &c. &c.; and it would appear that the first distinct account and proper classification of this affection, as well as the pointing out its true nature, was due to a young French physician, M. Bassereau, whose thesis was published in 1840. M. Valleix, in a series of papers published in the Archives Generales, during the first threc months of the same year, confirmed and authenticated by his experience the results at which M. Bassereau had arrived. This form of neuralgia attacks the nerves arising from the dorsal part of the spinal column; the author therefore first describes minutely the distribution of these nerves; but on this point it seems unnecessary to enter.

Dorso-intercostal neuralgia is a very common affection, occurring from the period of infancy to advanced old age, but is most common in those between seventeen and forty, and seems especially to attack the female sex. In the greater proportion of women attacked the menstrual secretion had been suppressed for a longer or shorter time. In a few the exciting cause appeared to have been over-work, a blow on the chest, and exposure to hurtful hygienic influences; the disease also appeared in a few cases on the disappearance of a cutaneous eruption, or during the course of *phthisis pulmonalis*. The left side of the chest was most frequently the seat of the neuralgic affection; and though all the intercostal spaces were liable to be affected, the sixth, seventh, and eighth intercostal spaces were far the most frequent seats of the disease. Two or three spaces were in general affected at one and the same time.

In all cases the characteristic mark of fixed pain in one or two distinct spots, increased on pressure, was present; whilst pressure over the rest of the nerves between these spots caused no uneasiness. The chief spot was at the posterior part of the intercostal space, a little beyond the spinous process. The second spot was about the middle of the intercostal space, and the third spot between the cartilages of the ribs, a little beyond the sternum. Pressure on these spots, coughing, or even the motions of the body excited the pain there, and frequently made it dart from one spot to the other. Various kinds of pain were experienced in the diseased spots, and neuralgic and also rheumatic pains were occasionally felt in other parts of the body. No disorders of the digestive functions existed which could be attributed to the neuralgic affections. The pulse remained unaltered, unless it was occasionally quickened during the severe paroxysm of pain. Neither heat, shivering, nor sweatings were present.

The disease in general commenced slowly, gradually increasing in severity, and disappeared in the same manner; but in its course it presented frequent exacerbations and remissions. Its duration was very variable; in general lasting a long time, often, too, passing into the chronic state, in which state it was very difficult to cure.

It is important to attend to the diagnosis of this neuralgic affection. Auscultation and percussion, and the direction and limits of the pain distinguish it from pulmonary affections. In rheumatism of the muscles of the thorax the pain is diffuse, less easily excited on pressure, more easily increased on movement of the body. *Angina pectoris* is distinguished by its mode of attack, and by the feelings of suffocation and anxiety always present with it. M. Valleix has not been able to satisfy himself whether angina ought to be included under this form of neuralgia,—in fact, this form of neuralgia in a very advanced stageor, whether it is a distinct affection; the above marks serve, however, to distinguish it in either case. Diseases of the spinal marrow, though causing a local pain resembling that present in this affection, are to be recognized by the pain being increased by pressure on the spinous process of the vertebra, and not increased by pressing at the side of it where the neuralgic pain is seated. In vertebral disease pressure on the ribs near the spine increases the pain, but does not aggravate the pain in this form of neuralgia. The longer the disease has continued the more difficult is it of cure, and the same is the case if there exist any organic lesion of the chest or abdomen. The treatment of this form does not differ from that recommended for the other forms of neuralgia. Flying blisters were found most successful, occasionally they were sprinkled with morphia to relieve extreme pain. Where the menstrual function was irregular ferruginous pills greatly tended to aid the removal of the disease.

The author enters into very long details of the particular symptoms, &c., present in the many varieties and complications of this form of neuralgia, and illustrates them by a few well selected cases. It would spread out this notice beyond due bounds to take any further notice of this section. The circumstance of this being the first distinct treatise, besides the author's own original paper, which clearly points out the diagnosis of this affection from those with which it has been so long confounded, render this one of the most important chapters of M. Valleix's interesting and instructive work. The whole chapter may be strongly recommended to the notice of practitioners as one of the most important recent additions to our knowledge of disease.

The fifth chapter is devoted to the consideration of *Lombo-abdominal Neuralgia.* This is a form of neuralgia still less known than even the last. Cases which can only be referred to this form have, however, been confounded by authors, and described under the head of spinal irritation; and the ileo-scrotal neuralgia of Chaussier, and the irritable testicle of Sir A. Cooper and others, are to be referred to this head. The author first proceeds to describe in detail a number of extremely interesting cases, to each of which he adds many valuable comments. It will suit our purpose better, however, to state the symptoms of the disease, its causes, &c., in the first place.

This form of neuralgia, like most others, is most frequently observed on the left side of the body; the nerves affected appear to be chiefly the branches of the first lumbar pair of nerves; sometimes being confined to the posterior, sometimes to the anterior branches. When the anterior branches were affected the disease assumed apparently three distinct forms, according as the pain was limited to the hypogastric region, to the testicle in the male, or to the labia in the female. The situations on which the painful sensations were experienced were five in number, 1. A little beyond the first lumbar vertebra, where the chief of the posterior branches of the nerve are distributed to the skin. 2. A little above the middle of the crest of the ileum. 3. A spot in the hypogastric region between the upper extremity of the inguinal canal and *linea alba.* 4. About the middle of the Fallopian tube. 5. The lower portion of the scrotum, or the middle of the labia of the female. Though these are the principal painful spots, and are the centres, as it were, from which the paroxysms of pain proceed, in severe cases the nerves themselves in all their course are tender on pressure. The pains have the same character as those of the other varieties of neuralgia, being fixed in these spots, and at intervals returning in violent paroxysms, when lancinating and thrilling painful sensations are experienced along the course of the nerves. The disease called irritable testicle is placed by M. Valleix under this form of neuralgia, because the disease is seated in the nerves derived from the lumbar region, and distributed to the scrotum and testicle. Sir A. Cooper himself suspected this disease partook of the nature of *tic-doloureux*, but in the narration of his cases he has not detailed the symptoms with sufficient minuteness to enable M. Valleix to ascertain whether the pain, though referred to the whole testicle, was not also seated, like other neuralgic affection, chiefly in one or more small and distinct spots, and only stretched over the whole branches of the nerves during the paroxysm. From M. Valleix's statements, it would appear that he has only seen one case which could be referred to this variety, and it so slight, and the symptoms so superficially noticed, that no particular conclusions could be drawn from it. On three different occasions we have had the good fortune to witness cases of this affection termed irritable testicle, and had not the slightest difficulty in making out the diagnostic marks which M. Valleix has so ably pointed out as characteristic of the true neuralgic character, viz. the presence of certain fixed painful spots, from which, as from nervous centres, the paroxysms of acute pain seemed to proceed. Little doubt can therefore remain that M. Valleix is perfectly correct in ranging irritable testicle among the varieties of lombo-abdominal, or lombo-scrotal neuralgia.

So little appears to be known regarding the period of duration, the progress, &c. of these forms of neuralgia, that the learned author does not even enter on the subject. On the subject of the diagnosis, however, he enters into considerable details. Lumbago is apt to be confounded with lombo-abdominal neuralgia, when the neuralgic disease affects the posterior branches of the nerves. The diffuse pain, its great extent, its being increased on motion, and its absence when the muscles are at rest, serve to distinguish it. He might have added, that, in all rheumatic pains seated in muscular parts, pressure on the surface tends to relieve the pain, but invariably excites the neuralgic pain. Rheumatic affections of the parietes of the abdomen are similarly distinguished from neuralgia. Inflammation of the uterus and cancer of that organ often similate neuralgia; but the small number of facts yet collected have not enabled M. Valleix to satisfy himself as to whether the pains attending these complaints are neuralgic or not. He seems to incline to the belief that they are not, as, on tracing the course of the lumbar nerves, he could not discover at any point of their course any painful spots. A fit of gravel is to be recognized by the extreme severity and constancy of the pain, its sudden appearance, and the suppression of urine to which it gives rise.

The same treatment is employed for this form of neuralgia as for all the others. Not having had it in his power to treat a case of irritable testicle, he cannot suggest any particular plan of treatment as likely to be efficacious.

Crural Neuralgia forms the subject of the sixth chapter. From the circumstance of this form of neuralgia being scarcely mentioned by any author, the author considers it one of the rarest forms of the disease, more especially as he has himself met with only two uncomplicated cases of it. The disease affects the branches of the crural nerve from its exit at the crural arch to its termination in the sole and inner side of the foot. In most cases in which this form of the disease has been seen the sciatic nerve has been also affected. Nothing is added regarding the cause, diagnosis, duration, or termination of the disease. It is directed to be treated in the same way as the other neuralgic affections, and it is added that M. Martinet found the oil of turpentine extremely useful in the cases seen by him.

Sciatica or Femoro-popliteal Neuralgia is treated in the seventh chapter, and, as might be expected from its importance, severity, and frequency, no fewer than 168 pages are devoted to this form of neuralgia. A very short and imperfect historical account is given, a matter of no great moment, as, from the extremely numerous writers who have touched on the subject, to have given even an outline of what each stated, would have occupied space, which had better be bestowed on the symptoms and treatment of the disease itself. Minute and accurate anatomical details are given of the origin and distribution of the sciatic nerve and its branches, and attention is directed to those branches in particular, which are the seat of the neuralgic pain, and to those spots o these branches, where, from their becoming superficial, the fixed pain is chiefly situated.

Till the publication of M. Valleix's paper on the intercostal neuralgia, sciatic neuralgia was regarded as the most common of all the neuralgic affections. After it, however, it is the most common form. Sciatica is rarely or ever seen in very young persons, from 20 to 60 being the periods of life at which most individuals are attacked. Men are more liable to sciatica than women. The causes of the origin of the disease appear to be obscure. The menstruation has been seen deranged in women. It has been seen supervening on or attending as a symptom in spinal disease, but it has not been directly traced to be produced by hygienic influences, though it appears to be more common during the winter than the summer months. Of 103 cases collected by the author, 46 occurred on the left side, 43 on the right, and 14 on both sides. The particular seat of the pain varied in the different subjects. In some it was chiefly experienced on the hip or thigh, in others it was confined to the foot or leg; in every case, however, occurring over one of the branches of the femoro-popliteal nerve. It is for this reason that he regards the plantar and popliteal neuralgias of Chaussier as the very same as that to which he confines the term femoro-popliteal or sciatic, as they are merely neuralgic affections occupying the more extreme branches of the same nerves.

The chief points on which the fixed painful spots occur are a point at the lower lumbar region, a little in front of the superior and posterior spine of the ilium, at the middle of the crest of the ilium, at the top of the sciatic notch, and near the trochanter; three spots occur on the thigh over the course of the nerves, three points in the neighbourhood of the knee, and one over the fibula, one at the ankle joint, and also over the dorsum of the foot. In general, a considerable number of these spots were painful at one and the same time. In these spots the pain is ascertained to be fixed by careful pressure over all the parts with the point of the finger, and it is at these spots that the paroxysms of pain originate as from centres, and dart along all the branches of the nerves. The pain which was seated in these fixed spots resembled that resulting from a bruise, and, contrary to the general belief, was invariably increased on pressure. In severe cases, even the nerve between the painful spots was somewhat painful on pressure. Pressure, movements of the limb, even coughing, deep inspiration, &c. were sufficient in many cases to excite the acute lancinating and thrilling pain, which formed the paroxysm in these neuralgic affections. Sciatica was often accompanied by neuralgic pains in other parts of the body, and also very frequently by muscular rheumatism. When the disease was of long duration the limb often became very much reduced in size, and in rare cases was affected by a kind of local paralysis.

In the cases noticed by M. Valleix, he was not able to ascertain that the respiratory or digestive apparatus were ever affected in consequence of this disease,—when the last appeared to be deranged, the derangement could always be traced to the action of medicines which had been employed; and febrile conditions of the system owed their origin to a similar cause. When the disease occurred in females the menstrual secretion was always diminished.

The anatomical lesions of the nerves found on the dissection of the parts which had long suffered from sciatica are regarded by the author as simple coincidences, and not the cause of the neuralgic pain. This conclusion is arrived at after a careful examination of the facts adduced by various authors, and from all we know of the subject at present, as well as from the fact that neuralgia occurs in so many various nerves of the body, where no organic lesions have ever been discovered.

The diagnosis of femoro-popliteal neuralgia does not appear to be difficult. Articular rheumatism is distinguished from it by the swelling, redness, and pain of the joint. Hip disease, in its early stage, by the pain being confined to the hip-joint, by the pain referred to the knee not being increased on pressure, and by the movement of the limb causing a deep-seated sensation of pain. Muscular rheumatism is more liable to be mistaken for it; but the extent of painful surface, and the increased pain on the slightest movement of these muscles, afford marks by which the affection may be distinguished from the neuralgic disease. In paraplegia the loss of power over the limb is greater than the amount of attendant pain, and both limbs are equally affected; but in neuralgia the amount of pain is most severe, the loss of power is not so great.

The longer the disease continues the more difficult it is to cure it. The treatment found most successful, on the whole, is blistering the painful spots. Blisters are most efficacious when rapidly healed and fresh blisters applied; by keeping open the blistered surface the pain often becomes intolerable, and the whole complaint becomes aggravated. Cauterization with the red-hot iron has succeeded when all other means failed. The oil of turpentine has been regarded by some as almost specific in the disease. Of 62 cases treated by the internal administration of turpentine, and mentioned in the work of M. Martinet, 47 were cured, 10 relieved, and 4 not benefited. Two or three drachms of turpentine were administered during the course of the day, in divided doses, either in aromatic syrups, or made up as a bolus with magnesia, or swallowed in wafer-paper, after stirring it into an adhesive mass with gum-arabic and sugar. In a few cases laudanum was given along with it. This medicine often produced nausea, pain in the stomach, vomiting, strangury, &c. but all these symptoms disappeared on stopping the medicine for a little while, after which it was again resumed till the cure was completed. Almost every article of the materia medica has been employed in this complaint, with varying success; baths, frictions, plasters, leeching, cupping, &c. have all likewise found their advocates; but electricity has found fewer advocates for its employment in this affection than in almost any other form of neuralgia. In the selection of means for the cure of this disease, M. Valleix recommends that flying blisters, frequently applied over all the painful spots, should be first had recourse to; and to prevent every chance of their inflaming and aggravating the symptoms, that warm cataplasms should even be laid over the spot after their removal. Should these fail to alleviate the pain, blisters dressed with the salts of morphia may be next tried; and if the complaint still remains obstinate, turpentine made into pills with magnesia ought to be had recourse to. As adjuvant means, frictions, with or without liniments, baths either of vapour or of water, the internal administration of narcotics, diluent drinks or sudorifics, ought not to be lost sight of. He cautions against having recourse to moxa, or the actual cautery, or leeching, as means whose use is at least questionable.

Such is a short and very imperfect abstract of the chief points touched on in this important chapter. To illustrate the numerous forms of the complaint, its pathology, its diagnosis, and its treatment, a very interesting and numerous selection of cases is detailed, each being followed by a few instructive remarks on the important points of the case.

The last chapter is devoted to General Remarks on Neuralgic Diseases; and he divides his subject in the same manner as he did when treating of each separate form, viz. into historical details, the anatomy of the parts, symptoms, progress, duration, termination, pathology, causes, diagnosis, prognosis, and treatment of neuralgia. This chapter, in fact, consists of the general conclusions which may be drawn from all those separate details which precede. He has thus another opportunity of forcing on the attention of his reader any important fact which might have been omitted or not sufficiently attended to in the sections treating of each disease separately; whilst his reader, from having perused all the previous statements, is fully prepared to go along with the author in the generalization of his views, and see the value of the author's investigations. It appears to be quite unnecessary to notice the general statements under almost any of these heads; a few points merely may be alluded to, to which M. Valleix seems to have devoted more especial attention, and arrived at results, which he says he has found to be nearly constant, and which are yet contrary to the generally entertained belief.

The first of these is, that, at certain fixed spots, a particular kind of heavy pain is experienced at all times; that from these spots the paroxysms of pain irradiate or dart; and that these spots are invariably the same in all subjects, and generally at those places where the nerve or nervous branch, from being deep-seated, becomes superficial, or where the trunk gives off branches. M. Valleix shows, that the reason why the pain on pressure at particular spots was not previously detected, was in all probability because the proper means to ascertain its presence were not taken. As one example of this, he has collected from various authors the narrations of 134 cases, and by their statements, it would appear, that pain on pressure was only experienced in 39 cases, whilst in the remaining 95, no pain was excited on pressure. M. Valleix, however, appears to have met with in his own practice, or that of his friends, fully as many cases, and, excepting in one single case, (and this one he states he had not an opportunity of examining himself), one or more spots existed where the peculiar pain was fixed, and from which, as from nervous centres, the paroxysms of lancinating pain proceeded. It was from finding that, at certain fixed spots, pain was continually present, and that, from these the paroxysms of pain always proceeded, that he was induced to examine into the anatomical relations of the nerves at these spots. The result was, that he found that the painful spots occurred at four different points of the nerves, 1. at the point of emergence of a branch from a nervous trunk; 2. at the point where a nervous branch perforated a muscle to reach the skin; 3. at the point where the terminal branches of the nerve begin to lose themselves in the cutis; and 4. at the points where a nerve, from being deep-seated, bends up to become subcutaneous. He also ascertained that, of these points, it was generally those which might be called the points of emergence that the pains were most frequently felt, and were most violent.

Modern inquirers, in their anxiety to find physical causes for every thing, appear to have allowed themselves to be led astray when they endeavoured to account for neuralgia on the supposition of an organic lesion. After a very full investigation of the subject in all the different forms of neuralgia, M. Valleix concludes, that "this painful malady depends on functional derangement, the organic cause of which has as yet eluded our research." He shows that, in the very few cases where any marks of disease were met with, these pathological appearances were different in nature from one another, though the disease was the same in all; and that in every other case, even though the disease had lasted for years, and was of the utmost severity, no organic lesion had been discovered. He therefore justly regards it as false theorizing to assert that neuralgia ought to be classed amongst the inflammatory diseases, or among those depending on irritation, hypertrophy, or atrophy of the nerve; seeing that the actual examination of the so-called diseased parts, as well as the symptoms themselves, show that no change of structure exists.

The only other point we shall allude to is the cause of neuralgic affections. Since the publication of the works of Kirkland, Duval, Lobstein, Teale, Pritchard, and others, it has been very much the custom to state that neuralgic affections may be and are produced in consequence of irritation, either of a distant organ of the body, or of some of the nervous centres, the brain, spinal marrow, or sympathetic ganglia. M. Valleix, entering on the inquiry in a truly philosophic manner, doubts every statement which cannot be substantiated by facts; after showing, therefore, what is and what is not neuralgia, he proves by a series of tables made up from the authentic cases he has been able to collect, that much erroneous theory exists on this subject. He divides the causes into predisposing and occasional; under the first head ranging age, sex, constitution, temperament, hygienic influences, food, previous disease, and seasons; and under the occasional causes, exposure to cold, and a disordered state of the digestive organs.

Two-thirds of the neuralgic cases occur between the ages of 20 and 50; and as to the influence of sex of 469 cases, 218 occurred in males, 251 in females. The different forms of neuralgia, however, attacked the sexes in different proportions. Thus, trifacial neuralgia attacked 124 males, 143 females. Intercostal and lumbo-abdominal neuralgia affected only 10 males, but 44 females; whilst sciatic and crural neuralgia attacked 75 males and only 52 females. It appears that those of a robust constitution are more liable to neuralgia than those of a weak one. Thus of 67 cases where attention was paid to this circumstance, 48 were of a robust constitution, 15 of medium strength, and 4 of weak constitution. In 60 cases only were particulars obtained relative to the places of residence of the parties affected, and the very astounding result was arrived at, that those living in dry, warm, and well-lighted apartments were more subject to neuralgic affections, than those living in damp, ill-ventilated, and ill-lighted chambers. No fewer than 35 patients coming from the warm, well-aired, dry habitations, the remaining 25 coming from damp and ill-ventilated abodes. The same was true of the only 44 cases in which notice was taken of the comparative abundance or privation of food of the parties, no fewer than 33 being from those who had regular, abundant, and substantial nourishment, and 11 from those who had irregular, and often very insufficient amount of food.

Much has been said of the influence of exposure to cold in the production of neuralgia, and of derangement of the digestive organs. M. Valleix, therefore, with considerable care, endeavoured to learn the exciting cause of the neuralgic affection in 67 cases, and found that it arose in 46 cases without any known cause; in 17 after exposure to cold; in 1 after suppression of the menses; in 2 after a sudden motion of the body, in 1 from a blow. As to the influence of the seasons it appears that, of 125 cases, 79 occurred during the five colder months,—29 of these occurring in January alone; whilst the remaining 56 occurred in nearly equal proportions during the other seven months of the year.

It will be seen from this statement, that M. Valleix does not place disorder of the digestive organs, or local disease of any kind, among the causes of neuralgic affections, and yet, if we are to put any confidence in the statements of previous writers, these would seem to hold no unimportant station among the exciting causes of the disease. Such, at least, is the impression which a cursory perusal of the works of these writers is apt to leave; but a minute examination of the cases detailed in these treatises has sufficed to convince us that, in so far as the disorder of the digestive apparatus is concerned, M. Valleix has arrived at the only conclusion which the facts warrant. The cases related as instances of neuralgic affections, depending on, or connected with, deranged digestive functions, prove not to be cases of true neuralgia, but a sympathetic affection of a different set of nerves, viz. those of the sympathetic or ganglionic system, the diseases of which, as recognized and described in the able treatise of Teale, are, as was shown by Bichat, different from the neuralgic affections of the nerves of ordinary sensation. It does appear, however, that M. Valleix has overlooked not an uncommon cause of trifacial neuralgia, or tic douloureux, viz. the irritation arising from a carious tooth. Of this we have seen more than one undoubted instance; the neuralgic pain being referred to the various branches of the trifacial nerve, and only occasionally to the tooth, but the disease obstinately resisting all remedies, till the tooth was removed, when it almost instantly disappeared. M. Duval, in his short but interesting "Observations sur quelques affections douloureuses de la Face considerées dans leur rapport avec l'organe dentaire," narrates several cases of a similar nature, and in many works subsequently published, may be found short notices of cases where a carious tooth has been the means of exciting and keeping up a neuralgic affection of the trifacial nerve. M. Valleix appears also to have overlooked or underrated the influence of wounds in exciting true neuralgic pains in nerves. We allude more particularly to the cases which have been recorded by Wardrop and others, where neuralgic pains have followed blood-letting at the arm, and which were removed by enlarging the wound, so as to divide the nervous branch, which was supposed to have been wounded. It may be, however, that the author is correct in omitting all notice of this last as a cause of true neuralgia, for we are still in want of some diagnostic mark of inflammation of the nerve itself; and it may happen that the author considers this form of nervous affection as not neuralgic, but inflammation of the nerve. As all notice of it appears to have been omitted it was deemed proper to notice it here.

Such, then, is a short account of the contents of this very interesting and instructive volume. As the only late treatise on the subject, which at all approaches to perfection, or to what a monograph of a disease ought to be; containing also several new views of practical utility, it is to be hoped, that some one competent to the task, and, in particular, one who could add all the information contained in the works of British authors, will bring it out in an English dress. The author, indeed, has gone so fully into his subject, has investigated the disease in all its bearings so thoroughly, that he has left little to do for those who may succeed him in treating neuralgia of the nerves of animal life.

ART. III.—*The Nervous System and its Functions.* By HERBERT MAYO, F. R. S., Senior Surgeon of the Middlesex Hospital, &c. London, 1842. Post 8vo, Pp. 182.

IN the present volume, Mr Mayo has given, in a series of aphorisms and short comments, a view of the present state of physiological knowledge on the Functions of the Nervous System. In this exposition there is perhaps not a great deal of novelty. But the different laws according to which the properties and functions of different parts of the nervous system are regulated, are stated with greater precision and clearness than in any work hitherto published. In some points and departments the statements are rather brief, and not, perhaps, so fully illustrated as, in a subject so difficult, obscure, and complicated, they require to be. It must, nevertheless, be allowed that Mr Mayo has performed his duty with the ability of a master; and those who will determine to study the subject, will find in the present volume, not only valuable information, but subjects for reflection and inquiry.

It would be idle to attempt an abstract of what is itself a condensed and succinct view. But it may not be improper to advert to some of the subjects most important to the physiological reader.

It may be regarded as established by the researches of Ehrenberg, that the fibrous-looking part of the brain and the nerves consists of small tubules or hollow cylinders. Whether these contain a fluid or not is of little moment. It appears to be a reasonable conclusion, nevertheless, that this tubular structure is connected with the functions of transmitting impressions from the extremities to the centre of the nervous system, and the motions of volition from the centre to the extremities. This idea Mr Mayo adopts, and speaks almost uniformly of a nerve-tube; the *nerven-rohre* of Ehrenberg.

Though the sentient and motific nerves be distinct in origin and structure, yet they are often closely associated;—so much so, that for ages they were confounded and regarded as one. This intimate association, which at first sight seems perplexing, is actually requisite for the proper performance of the functions by the organs or parts to which these nerves are distributed.

Mr Mayo's nineteenth aphorism is the first which in this respect deserves attention.

> "It has been proved of some, and may be anticipated of all the nerves, that their terminations consist in loops; a nerve-tube having never probably a terminal end, but at the distal point of its distribution bending to return upon itself, or to be continuous with another nerve-tube. It may be anticipated, likewise, that their origins will present the same feature."—P. 43.

What is the purpose of this union or anastomosis is a very natural question. It appears to be that in general one sentient nerve requires to be associated with one voluntary or motific nerve, and the converse.

> "The distal arrangement of the muscular filaments of nerves in muscles was seen by Messrs Prevost and Dumas to be such as I have here described.
>
> "Upon the face and on the tongue union of larger filaments by

apparent anastomosis repeatedly occurs. In these instances the union seems to be always between sentient nerves and voluntary nerves.

"In the organs of the special external senses, and in the gray matter of the brain, there is probably a special nervous organization for receiving impressions, in which nerve-tubes probably terminate either in a net-work or single loops,—a compound or simple provision for currents."—P. 43.

The twentieth aphorism is very similar, and may indeed be regarded as an expansion, or at least an allied proposition of the principle announced in the nineteenth.

"The nerves of sensation and motion, which supply any given region in the body, are derived from the same part in the nervous centre;" or, as the author states it afterwards, "Nerves of sensation take their rise near those nerves of motion, the impulses transmitted along which they habitually excite or guide." Both expressions occurred to him, he adds, "in attempting to reconcile the seeming confusion existing at the origins of the nerves of the medulla oblongata, with the remarkable order and regularity observed in the organs of the spinal nerves."

"Or, in detail, the facts justifying these expressions may stand thus.

"Each spinal nerve distributes sentient and voluntary nerves to one region, and its two roots rise from the same segment of the spinal cord.

"The ganglionic part of the fifth nerve bears the same relation to the ganglionless part of the fifth, to the hard portion of the seventh, and to the sixth nerve, collectively, which the posterior roots of a spinal nerve bear to its anterior root. The two are distributed to the same parts, one for sensation, the other for voluntary motion.

"But the auditory nerve must be brought to rise near the hard portion of the seventh, because the latter is voluntary nerve to the muscles of the organ of hearing.

"The ganglionic fasciculi of the glosso-pharyngeal are required for a parallel reason to rise with its ganglionic (ganglionless) fasciculi; and of the pneumogastric nerve the same.

"The ninth has to rise near the origins of the fifth and eighth, as it ministers to mastication and to speech.

"The third and fourth have to rise near the second, as they govern the motions of the eyeball and iris in connection with vision.

"The first, or olfactory nerve, rises near no motor nerve. But it may be remarked that, in animals in which it is developed, it evidently less excites single actions than conduct; it governs their instinctive choice, and, accordingly, it actually spreads itself at its origin into the brain. Respecting the spinal accessory, I can advance nothing that satisfies me."—Pp. 44–45.

The interpretation of the whole of this may, we conceive, distinctly be given in the following manner. In every organ which requires a supply of nerves to regulate its functions, there are two if not three orders of motions. The first is a function of sensation or recognition of external impressions, whether these impressions originate in the coverings of the organ, or are the result of external objects applied to it coming in contact with it. This impression transmitted to the brain either instinctively, or through the medium of the will, gives rise, or at least may give rise to motion in the organ. The second, therefore, is a function of motion, or a function by which motions may be excited in the organ or produced by the organ; and as these must originate in the centre of the nervous system, and must be guided, ordinated, and directed by the centre of the nervous system, or by some principle residing in that centre, it appears that the most natural way for accomplishing this, according to the principles on which animal bodies generally are constructed, we find the motific nerve placed close by the sentific nerve.

If it be argued in opposition to this, that if it pleased the Creator, these sensations might have been transmitted without nervous tubes, and motions might have been excited, also, without nerve-tubes, it must be answered that the general principles on which the frame is constructed show that this is, at least, improbable. These principles show that there must be some means by which remote parts must be connected with the centre of the nervous system.

If it be further argued that there seems no reason why these two sets of nerves might not have been separate in origin and in course, it must be answered, that it seems more in accordance with the usual principles of method and arrangement, concentration, and economy of structure, as well as space, not to speak of simplicity, that when two nerves with different properties are sent to one texture or one organ, they should rise together, and proceed in the same course, than be separate. The argument is one of probability, at least.

The office of the anterior pyramids, Mr Mayo infers, is probably that of transmitting impressions from the brain to the segments of the spinal chord, not from the chord to the brain. This inference he deduces from the fact, that the size of the anterior pyramids is not proportionate to that of the spinal chord, but to that of the brain. The other parts of the *medulla oblongata,* he observes, have a contrary ratio, and are proportionately likely to contain the upward channels of communication. He further thinks that the phenomena of hemiplegia of the opposite side from cerebral lesion, greatly favours the hypothesis now enunciated as to the direction of the current of influence in the anterior pyramids.

It is certainly highly probable that there must be some channel for transmitting impressions, or rather motific volition *downwards*, as well as a channel for conveying impressions of recognition upwards; and these anterior pyramids may be as likely to be the means as any other part. He afterwards expresses himself in very confident terms as to the truth of the proposition:

"This positive influence," he says, "which travels downwards from the brain towards the palsied parts, is certainly transmitted to the anterior pyramids." It is certainly difficult to understand why in a lesion of the upper parts of the brain, the side of the body opposite should be paralytic, unless this be admitted to be the case.

As the author advances, he considers the circumstances which tend to elucidate the nature of the functions of the brain and the spinal chord, and takes a brief view of the sources from which our most satisfactory information is derived, viz. vivisection, pathological phenomena, the facts of comparative anatomy, and those resulting from comparative observation.

Proceeding onwards, after fixing the characters indicating the superiority of the human brain over that of the various classes of animals, he next inquires what evidence we have for assigning separate functions to separate portions of the nervous system, and what are these separate functions. This leads him to inquire in the 52d aphorism, whether there are grounds for adopting the phrenological chart of the cerebral organs; and we have at length the following inferences.

"However, for my own part, I profess that I have not sufficiently compared the craniological chart with nature to make my opinion of value as to its correctness. Nevertheless, I have not entirely neglected what opportunities of observation have come in my way. But I certainly am not satisfied that even the principle of distribution of the mental elements which is adopted by phrenologists is just;—that the intellects lie in the front, the moral impulses in the middle, the inferior impulses at the back of the head. Indeed, I have arrived at no more than a few general impressions, rather of a physiognomical than physiological character, which are perhaps hardly worth stating.

"I think, *as an artist,* that persons of good capacities and of well-ordered moral impulses, have heads of a certain size or figure, or both.

"1. Of the two elements, shape appears to me of more consequence than size.

"2. In a small head the forehead should not recede, but should be broad or high; both together give most promise; and the upper part of the head must be round and full, not narrowing towards their vertex, nor the upper part of the sides of the head cut away. Length of head appears immaterial. The late Professor Coleman, whom I had the pleasure of knowing, a man of a social and most amiable disposition, quick of observation, with considerable reflective powers, of a right heart and a strong head, had a cranium, of which the posterior fifth appeared to have been obliquely sliced off. Shortness, indeed, but without so much abruptness, is almost necessarily a feature in well-formed small heads.

"3. If the head is altogether large and ample, a receding forehead does not seem to be at variance with the possession of high intellectual and moral qualities.

"4. The head, in addition to being large, very lofty at the middle of the vertex, the forehead sloping, is a mould which has gone with the highest intellect. In this mould was cast the head of Sir Walter Scott. The head of Shakspeare appears to have been similarly shaped.

"5. A head of ordinary dimensions, the forehead vertical, but neither high nor broad, the vertex well-rounded and of a good height, frequently accompanies great parts. Such was the shape of the heads of Pitt and of Chatham. The forehead of Chatham was something broader than that of his illustrious son.

"6. A large eye with long eyelids often accompanies eminent talent; and whether connected with the size of the orbit or with development of the anterior and inferior convolutions of the brain, fullness and squareness of the superciliary region generally go with this feature. In the forehead of Newton, else nowise remarkable, this prominence and largeness of the lower part of the forehead are strikingly pronounced.

"7. The head of Napoleon was characterized by its size and squareness, the forehead broad and vertical, and at the same time higher than ordinary: the eyes remarkably large, and the eyelids long. The largeness of the superciliary region was balanced by an equal mass above it.

"When large heads are met with in combination with dull capacity, their shape is commonly ungainly, and projections of bone, having no relation to cerebral development, catch the eye.

"The worst physical character is great lateral narrowing of the upper part of the head, with a coarse breadth at the lower and middle part. Add to this a mean forehead, and want of symmetry of the two sides, and the portrait is yet deteriorated.

"The heads of the ablest and the best, whether large or small, generally look more carefully shaped and better finished than those of commoner persons. The shape, too, in which they are fashioned, seems better filled out; so that the bony boundaries are lost sight of, and the roundness or fullness of the contained organs is the predominant characteristic."—Pp. 101–104.

The third chapter, including nineteen aphorisms, gives a view of the influence of the nervous system, especially the great sympathetic and the ganglia over the corporeal functions.

The fourth chapter on perception, and the laws by which it is regulated, is concluded with the following confession regarding the transition from perception to mental phenomena, and their influence on the progress of civilization and intellectual improvement.

"Here properly I should stop, having reached the limits of the physiological part of these inquiries; but the next step made by the human understanding is too great to be passed without notice."—P. 147.

Accordingly, Mr Mayo breaks out into a very eloquent and philosophical peroration, in which he takes a rapid view of the progress of mankind from barbarism to refinement, from ignorance to knowledge, from crime to virtue, from misery to happiness, from penury and destitution to comfort, and wealth, and affluence.

"But let us look at the progress of those families of mankind which have manifested the capability of moral and intellectual developement.

"In countries by the eastern shores of the Mediterranean civilization began. Between 2000 and 1500 years before the Christian era all its elements were there already put forth. In Egypt, science and the arts, though coupled with degrading superstitions; near, for a while within it, the people who preserved the knowledge of the true God; and Phœnicia could boast her commerce and letters, and Asia Minor sent her colonies to Greece and Italy. It was the dawn of the first day of the world, which with the night that followed lasted 3000 years.

"As that day went on, to string exertion to its utmost tension, war, hitherto uninfluential on the general destinies of mankind, broke forth in invasion and conquest; and the Persian, of a middle race, unable wholly to emerge from barbarism, overran and subdued Egypt, and Asia Minor, and threatened Greece, whose energies and loftier nature stayed and repelled his myriads.

"Then shone the triumphs of that wonderful people; and heroism and valour, the noblest literature, the perfection of imaginative art, the subtlest philosophy,—but not these alone,—the truest conception of morals, formed their chaplet. Let me quote the golden words of the greatest of their sages, to show how admirable was their wisdom.

"'God is one, perfect in himself, giving the being and well-being of every creature; what he is I know not, what he is not I know.'—PLAT. *Phæd.*

"That God, not chance, made the world and all creatures, is demonstrable from the reasonable disposition of their parts for use and defence. * * He is such and so great as that he at once sees all, hears all, is every where, and orders all.'—XEN. *Mem.*

"'The best way of worshipping God is to do what he commands.'—XEN. *Mem.*

"'Justice and every other virtue is wisdom.'—XEN. *Mem.*

"'A just man and a happy man are one. He who, in opinion, divided honesty and profit (which are coherent by nature) did an impious act.'

"'To be employed is good and beneficial; to be idle hurtful and evil. They that do good are employed; they that spend their time in vain recreations are idle.'—XEN. *Mem.*

"'The body, being compounded, is dissolved by death; the soul, being simple, passeth into another life, incapable of corruption.'—PLAT. *Phæd.*

"'The souls of the good after death are in a happy estate united to God; the bad suffer condign punishment.'—PLAT. *Phæd.*

"'I have not reigned to-day,' if the day had passed that he had not conferred a benefit, was the saying of the illustrious pupil of Aristotle, whose military genius rolled back, after two hundred years, the tide of war over Syria, Egypt, (whose strange fate it has been to have fallen the successive prey of every conqueror from Cambyses to Napoleon,—of the Greek, the Roman, the Arab, the Turk,) over Persia and India; and war found then an office which seemed to legitimate it,—the diffusion of civilization; war, now her foe, and fostered by one civilized country alone, which, keeping the front rank in intellectual progress, labours under a strange retardation of moral development.

"But, in ruder times, war advanced the progress of mankind; and by war came Roman greatness. Rome, whose virtues were patriotism and courage, her genius conquest, who made her own the arts and letters of Greece, and the religions of all the world she subjugated; whose function it was to impart civilization, directly or indirectly, to the entire white race of men,—as provincials, as allies, or as the hostile neighbours, who in time were to rend and share her empire. But not civilization alone, but with it true religion, that, where Rome stood, there was left Christendom.

"Then fell comparative darkness,—the figurative night of the middle ages,—when rapine and violence lorded it over the world; till nature reclaimed her order, and the arts of peace undermined feudal tower and donjon wall, and the foundations of a higher civilization were cemented.

"But in that night of barbarism, there had been the stars, and Alfred had reigned, and justice had sometimes been seen on earth, and the lamp of science and learning had not been extinguished, and there had been watchers for the dawn; and in that night had been the lofty dream of chivalry, which left on the waking world the impress of Honor.

"Then began the second day. Towards fifteen centuries of the Christian era, and the same elements reappear in freshened activity, as at the same time before it. For Phœnician adventure, Columbus; for European colonization, that of the New World; for Cadmus, printing; for Moses, Luther.

"But what is the promise of this second day? In the first, three words were expounded,—where, when, why. Another interrogative remains,—how. Its exposition is already manifest, in the triumphs of physical science, whose great prophet declared, 'Knowledge is power.' But in morals.—Alas! the example of the same eminent person shows that to be wiser is not necessarily to be better, and the experience of centuries has proved how little may result from the soundest ethical views, and from the positive denunciations of religion.

"But yet one need not despair;—

"One thing certainly contemplated in the scheme of creation is the developement of the faculties of mankind, and a progression from barbarism to civilization. Now it is written in our hearts, and declared by revelation, that moral excellence is the noblest attainment. Is nature so powerless for good, or Providence so inconsistent a cause, as to have given man the means of indefinite improvement in that which is secondary and inferior, and to have condemned him to remain stationary and unimproved in that which has the highest worth?

"Again, the enlargement of knowledge, and that in a continually-increasing ratio, and its diffusion, are things certain. Is it possible that this cause should fail to make men individually better, by furnishing to many new mental resources and occupation, by habituating increasing numbers to the investigation of truth, and by bringing home to general conviction that temporal prosperity and happiness depend upon self-restraint and moral conduct?

"Again, the application of enlarging knowledge to government, the efforts of legislation to prevent one class spreading immorality through another, the increased repression of crime resulting from just views of the object and operation of punishments, the provision of education for every class and wholesome encouragement given to resort to it, and if, for long to come, the extreme circumference of society must be ground down by iron penury, yet judicious attempts to mitigate that awful allotment, joined above all things with the attainable good of elevating the condition of the class immediately above the lowest, and the influence on every other class resulting from such efforts,—as they are things certain to follow, can they fail to lead to a gradual progression of moral improvement? and may one not add, that, in proportion as men are drawn towards the practice of morality, the influence of religion will be more powerful, which, if it fail to make bad men good, yet never fails to make good men better?

"And these our hopes, do they not find encouragement even in the visionary interest which men take in the future progress of their race, and in the allied infirmity of wishing to live in its remembrance?"—Pp. 152–158.

It cannot be denied, that these are the sentiments of an elevated and benevolent mind; a mind enlightened by the principles of a noble and dignified philosophy, enlarged by the cultivation of learning and science, and elevated by the influence of a system of pure religion. The only subject of regret is that the benevolent hopes of the author have little chance of being speedily realized. Experience shows that, as the human race increases in knowledge, it by no means follows that they are elevated in the scale of moral worth. To speak more accurately, knowledge is often superficial and limited, and, though science has been carried to a high degree of advancement, all ranks of society have not derived from it the benefits which have flowed to its immediate cultivators. Moral improvement has in few cases kept pace with the degree of intellectual cultivation. The impartial observer, who looks beyond the surface of society, sees that even the purest system of religion which the world ever saw is totally incapable of impressing practically the obligations of morality. Unhappily, religion is too often a matter of speculation, not understood to guide the conduct or regulate the actions of mankind; and, from mistaken views of present advantage, the first and most obvious principles of morals are disregarded and violated.

PART III.

MEDICAL INTELLIGENCE.

ANATOMY AND PHYSIOLOGY.

Lymph Globules of Birds.—The description of the lymph globules of birds has been hitherto drawn from the pale globules of their blood. Hewson figured the lymph particles from the lymphatic glands of birds as elliptical, like the nuclei of their blood discs.

Mr Gulliver has examined the particles in the juice of the lymphatic glands of many birds, and given numerous measurements of these particles, which he depicts as globules slightly smaller than the lymph globules of Mammalia. This corresponds to his former observations on the purulent matter and the lymph globules of the Camelidæ. (Med. Chir. Trans. v. xxiii. and Lancet, 1840–41.—*Contributions to Minute Anatomy, London and Edinburgh Phil. Magazine, June* 1842.)

Structure of Fibrine.—The red clots of fibrine found in the dead body in close corpuscles similar, though of a reddish colour, to the pale organic germs depicted by the author in the appendix to Gerber's Anatomy. Both kinds of corpuscles may be altered blood discs; but if so, both the coloured and pale germs of fibrinous clots must have undergone great changes in form and chemical characters. The germs exhibit nuclei when treated with acetic acid, &c., while precisely the same treatment will not disclose any nuclei in the free or floating blood discs. A figure is given of the germs contained in a net-work of fibrils; these latter are also shown in fibrine obtained by washing from the blood of a bird; and this fibrine is pervaded by particles like the nuclei of the blood discs.—(*Gulliver's Contributions, Phil. Mag. for August* 1842.)

Nuclei of the Blood Corpuscles of Vertebrata.—The author gives two figures to illustrate the effects of several reagents on the blood corpuscles of Mammalia and of the lower Vertebrata. The corpuscles of man, as the author formerly stated, are reduced about one-third or one-fourth in size after completely removing all their colouring matter by repeated additions of large quantities of water. These washed corpuscles appear very faint and pellucid, presenting no appearance of a nucleus, even when treated with acids and other reagents; nor do the washed blood discs agree in any respect with the particles which have been commonly described as the nuclei of the blood corpuscles. Now when all the colouring matter is in like manner washed away from the corpuscles of the lower vertebrata, both envelopes and nuclei remain, and are plainly distinct parts. The effect of acids is equally different on the blood discs of Mammalia and on the discs of the lower Vertebrata; and the oval blood corpuscles of Mammalia agree in structure with the circular corpuscles of other Mammals, and not with the oval discs of the oviparous Vertebrata.—(*Gulliver's Contributions, Phil. Magazine, August* 1842.)

Chemical Characters of the Spermatozoa—Molecules of the Semen.—The spermatozoa of Mammalia are but little or not at all affected by nitric, muriatic, acetic, oxalic, tartaric, and citric acids; while the spiral spermatozoa of birds are very susceptible of the action of vegetable acids, although the cylindrical spermatozoa of birds are nearly allied to those of Mammalia in chemical characters. The chemical characters of the spermatozoa of man may perhaps be turned to account in medical jurisprudence.

The molecules may be connected with the perfecting of the semen, as they are to be found in small numbers at all times in that of healthy men, and in great abundance in that of birds and reptiles, just before the testicles become ripe, in which animals the molecules disappear or become scanty as soon as the spermatozoa are fully formed. The molecules were described as resembling in form and chemical characters the minute particles figured by the author in the juice of the supra-renal glands.—(*From a paper read at the Zoological Society by Mr Gulliver, July* 26, 1842.)

Muscular Fibre of the Gullet.—In a paper read at the Zoological Society, June 14, 1842, Mr Gulliver mentioned the following as some of the results of his inquiries.

1. In Man, the Quadrumana, Viverridæ, Felidæ, the porpoise, the horse, &c., the muscular fibre of animal life terminates on the gullet at a greater or less distance before it reaches the stomach.

2. In the insectivorous Feræ, in the Ursidæ, Mustelidæ, Ruminantia, Rodentia, &c., the muscular fibre of animal life runs along, or forms a complete investment to the entire length of the gullet, and sometimes extends a short distance on the cardiac end of the stomach.

3. In birds and reptiles the gullet has no covering of the muscular fibre of animal life.

4. The statement, therefore, of Professor Müller, that "the third act of deglutition is perfectly involuntary, being performed by the muscular fibres of the œsophagus, which are not in the slightest degree capable of voluntary motion," seems to be applicable to some animals, but not to others, especially those in par. 2.

On the Figure of the Oval Blood Corpuscles of the Vertebrata.—Though the usual figure of the blood discs and of the Camelidæ, and of the oviparous Vertebrata is an ellipse, of which the long diameter is from one and a-half to twice the short diameter, Mr Gulliver shows that there are many exceptions to this rule. In other words, the corpuscles may either be comparatively long and narrow, or broad and short. Of the former shape M. Mandl stated that the corpuscles of the Crocodilidæ were a singular example, as he found that the length of the corpuscles of *Crocodilus lucius* was nearly three times as much as their breadth. Subsequently (see Proc. Zool. Soc. Nov. 10, 1840,) Mr Gulliver found that the blood discs of *Crocodilus acutus*, and of *Champsa fissipes* had the more common elliptical figure first mentioned.

As examples of the elongated ellipse, he has since pointed out the corpuscles of the snowy owl, passenger pigeon, great butcher bird, nightingale, and snow bunting; and of the short and broad ellipse, the corpuscles of the Java sparrow, and of some other granivorous birds.

Lastly, he now brings forward observations to show that the corpuscles of the British ophidian reptiles are examples, both of the ordinary and of the more elongated ellipse; for while the blood discs of the slow worm are long and narrow in figure, those of the snake and viper agree with the common shape, as the following average measurements, in fractions of an English inch, will show,

	L. Diameter.		S. Diameter.
Slow worm (*Anguis fragilis*, Linn.)	$\frac{1}{1175}$	.	$\frac{1}{2688}$
Snake (*Natrix torquata*, Ray,) .	$\frac{1}{1271}$	.	$\frac{1}{2167}$
Viper (*Coluber Berus*, Linn.) .	$\frac{1}{1274}$	.	$\frac{1}{1860}$

(From a paper read by Mr Gulliver at the Zoological Society of London, August 9, 1842.*)*

Smallest Blood Corpuscles of Mammals.—Before Mr Gulliver's discovery of the singularly minute size of the blood discs of the musk deer (See Med.-Chir. Trans. Vol. xxiii.; Dublin Medical Press, Nov. 27, 1839; Lond. and Edin. Phil. Mag. December 1, 1839,) those of the goat were the smallest known. In a paper read at the Zool. Soc. August 9, 1842, he states that the blood corpuscles of the ibex are slightly smaller than those of the goat, and therefore intermediate in size to the corpuscles of the goat and those of the musk deer. The following average measurements of the discs were given; and then Mr Gulliver took occasion to remark that all his microscopic measurements were invariably expressed in vulgar fractions of an English inch, however they might have been set up in type for the sake of convenience.

Goat (*Capra Hircus*, Linn.)	.	$\frac{1}{6366}$
Ibex (*Capra Caucasica?*)	. .	$\frac{1}{6658}$
Musk deer (*Moschus Javanicus*, Pallas,)		$\frac{1}{12325}$

Refutation of Liebig's theory of the uses of the Respiration and of Food. By M. J. J. Virey. *(Journal de Pharmacie,* May 1842.)—It may be recollected, that Liebig holds that the chief use of the food is to supply carbon and hydrogen, which, uniting with the oxygen absorbed from the air, give rise to the generation of animal heat. He consequently holds that there is a certain fixed relation between the amount of food consumed, and the quantity of carbon and hydrogen thrown off at the lungs. M. Virey opposes this theory, as contrary to common observation, as, even though it be allowed to be applicable to mammalia, birds, and reptiles, it is by no means to those animals which respire by means of branchiæ. Thus all animals with branchiæ consume but little oxygen, comparatively speaking, and yet many of them devour very great quantities of food. Even the largest and most voracious of the reptiles, as the alligators, crocodiles, &c., which devour enormous quantities of food, under a burning climate too, respire feebly with their vesicular lungs, and consume but little oxygen.

Fishes, whose blood is but imperfectly oxygenated by the branchial apparatus, are perhaps among the most voracious of animals, and yet, according to Liebeg's theory, they ought to eat little, because they consume little oxygen.

The same holds true of the Mollusca. The cuttle-fish, *buccinum, strombus, murex*, &c. grow to a large size; but their respiration is very imperfect, and yet they are great flesh-eaters. The Crustacea, again, as the crabs, lobsters, &c. grow rapidly, because they are great eaters; but their branchial apparatus is not fitted to consume much oxygen.

In all these animals assimilation takes place very rapidly, notwithstanding their feeble respiratory powers; and they are, besides, by no means deficient in activity or muscular powers, though their flesh be but feebly azotized or animalized, and their blood is always cold.

If it be one of the characters of vitality, that the more perfect this principle is the greater is the number of germs, or eggs, or fœtuses produced, then, quite contrary to Liebig's theory, the number of germs produced is in the inverse ratio of the perfection of the respiratory functions. Fishes and mollusca deposit their spawn or eggs by millions; but the mammalia, and even the birds, whose respiratory functions are the most perfect, are in this respect infinitely behind these. On the other hand, it is seen that the number of germs or eggs is rather proportioned to the nutrition received; for the amount of food taken is not proportioned to the respiration in the animal kingdom.

M. Virey, therefore, concludes, that the vital force or central nervous energy has more to do with the production of animal heat than the consumption of carbon at the lungs, and this for three special reasons; *1st*, Because a fecundated egg resists a freezing temperature longer than one which has not been fecundated. *2d*, That a hybernating insect, reptile, or animal, or even trees during winter, by the sole influence of a vital power, resist a freezing temperature, whereas the same animals, if dead, would be instantly frozen. *3d*, That many mammalia and birds keep themselves warm even in the most rigorous winters under the Pole, not in consequence of a greater amount of oxygen consumed, nor by a greater amount of muscular activity, but in consequence of a more abundant highly azotized or animalized nourishment.

On the Nature of the Fat Substance of Milk. By M. ROMANET. (*Comptes Rendus des Seances de l'Academie des Sciences*, 4th April 1842.)—According to M. Romanet the globules of the milk are entirely formed of butter, which exists as a pulp enveloped by a white, translucent, elastic, and resistant pellicle. Churning breaks this pellicle or cyst, and allows the fat or butter to escape, when the pellicles float about separately, and constitute the white particles which give consistence to the butter-milk.

PATHOLOGY.

Recovery from Wound with loss of Brain. By M. POILROUX. (*Bulletin de l'Academie Royale de Medecine*, April 1842.)—A young man, 20 years of age, received, on the right side of the forehead, a blow with a stone. He instantly fell, but, recovering his senses, got up, and was able to walk. He suffered somewhat from nausea that night and next day, but no paralytic symptoms ever appeared. The skull was deeply driven in over a space about the size of a trepan head. The soft parts were severely injured, and a portion of brain had escaped from the wound. Copious suppuration soon commenced, when several additional portions of brain escaped along with the purulent matter. Nervous symptoms threatened to come on on the eighth day after the accident, but disappeared on opening up the wound so as to allow the purulent matter and some fragments of bone a free issue. The bone was found to be depressed in the form of a cone to the extent mentioned above. The suppuration gradually lessened, healthy granulations sprung up over the surface of the wound, and the patient recovered without having had a bad symptom.

On the Solution of Urinary Concretions by means of Carbonated Alkaline Waters. (*Comptes Rendus des Seances de l'Academie des Sciences*, April and May 1842.)—Many interesting papers have been communicated to the French Academy during the last and present year, on the solvent powers of carbonated alkaline water, and particularly that of Vichy. MM. Prunelle, Longchamps, D'Arcet, and Petit, have related numerous instances of the efficacy of this alkaline water in producing solution of various kinds of urinary calculi, but have been opposed by MM. Pelouze, Leroy d'Etioles, and others, on the theoretical ground, that the use of alkaline waters would produce a precipitation of the earthy salts naturally contained in the urine, and thus give rise to the formation of earthy calculi. M. Ch. Petit, in a recent paper, has satisfactorily proved the groundlessness of this objection, and shown, that during the time the individual is using this water, no earthy salts are secreted, but that the character of the urine is totally changed, so that no earthy salts could be precipitated in the bladder, and give rise to an increase of the existing calculus. He also satisfactorily proves, that, even though earthy matters were precipitated by the alkaline waters in the bladders, they would be passed off along with the urine, as the mucus of the bladder is itself dissolved by the alkaline waters, so that no substance is left in the bladder to bind together the earthy particles.

Transfusion of the Blood of a Goat into the Veins of a Man. By Dr BLIEDING. (*Journal de Pharmacie*, May 1842.)—A man, 38 years of age, was seized with an hæmoptysis, which continued so long, and was so violent, that the only means of saving his life appeared to be by supplying the loss of blood by transfusion. On the fifth day after the attack a canula was introduced into the median vein of his left arm, a syringe, previously heated, was filled with blood drawn from the jugular vein of a goat, and about five ounces were injected into the vein of the man. Immediately he complained of a feeling of oppression ; but this soon afterwards went off. An attack of phlebitis came on next day, but was subdued in eight days, by means of cold applications alone. His strength from this day returned, and at the end of three months he was able to resume his usual occupation. It is remarked, as the interesting point of this case, that it proves that the injection of the blood of one animal into the veins of another is not necessarily fatal.

Report of the French Academy on Vaccination for the year 1840. (*Bulletin de l'Academie de Medecine*, April 1842.)—During the year 1840, 836,789 births took place, and of this number 525,509, or five-eighths, were vaccinated, leaving three-eighths unprotected from the contagion of small-pox. Particular reports were only received for 45,060 of these cases of vaccination, and of that number, 44,179 took the vaccine disease perfectly, whilst in 881 cases the vaccination failed. From this it appears, that rather more than a half of all those born during that year remain unprotected from the contagion of small-pox. In two cases, vaccine eruptions appeared over the body, and the fluid from the vesicles produced the true vaccine disease in those who were inoculated with it.

Epidemic small-pox attacked 14,470 individuals during the year 1840, of whom, 1390 were disfigured or left with broken down constitutions, and 1668 died. Twenty-four cases occurred of a second attack of small-pox, and of this number three died.

Few of those who had been long since or recently vaccinated took small-pox. A few were affected with a varioloid eruption or with modified small-pox, generally of short duration however, and mild. Of 406 persons who had been previously vaccinated, and were attacked with this varioloid eruption, only six died, or more properly only four, as two died from other causes than this disease, giving the extremely small proportion of one death out of 101 who took the varioloid disease.

2214 individuals were re-vaccinated, and of this number, 1704 failed, 227 had imperfect vesicles, and 270 perfect vesicles of the usual appearance. Three of those who were revaccinated with success took the varioloid disease.

The following conclusions were adopted by the Academy.

1. Vaccination preserves from small-pox. This preservative power is not unlimited for all individuals, as a certain number remain still exposed to an eruption known by the name of the varioloid disease.

2. This eruption, though of the nature of small-pox, is in general mild, and free from danger. During the year 1840, of those affected with the

varioloid disease there only died in the proportion of 1 in 101, whilst small-pox cut off 1 of every 8½.

3. A first vaccination destroys the aptitude to take the vaccine disease a second time, in the same way as it does that of small-pox. There are, however, certain individuals in whom the aptitude to take the disease returns after a certain time. The same is true of individuals who have had small-pox, who will take the vaccine disease in a regular manner; but it cannot be concluded from this that these individuals would have taken small-pox.

4. The most perfect vaccination cannot be held as guarantee that all, without exception, are perfectly defended from the chances of taking small-pox.

5. In general, small-pox attacks an individual only once during life. There are, however, individuals who are liable to a second attack, which may be as severe as the first.

The Evolution of Light from the Human Subject. By SIR HENRY MARSH, Bart. M. D. &c., (Dublin, 1842, *and Provincial Medical Journal.*)—In this tract, which contains a general account of the circumstances under which luminousness takes place in the animal world, the author details two curious instances of its occurrence in the human subject.

"Electric sparks, accompanied with a crackling noise, have also been seen to issue from the skin of some individuals when rubbed lightly and quickly with a linen cloth. An instance is related by an Italian physician of a lady of Verona, from whose limbs, 'sparks of fire flew out plentifully as often as they were lightly rubbed with linen.' He adds, that 'oftentimes having rubbed her hands upon her sleeve, she observed a flame running about, as fired exhalations are wont to do.'

"According to the same writer, similar phenomena were observed on the person of a bookseller at Pisa, when the skin of his arms and back was rubbed with linen. I have myself seen two individuals in whom this phenomenon was in a remarkable manner manifested.

"Having now briefly referred to some of the most striking instances of luminousness throughout the extended range of inorganic and organic matter, it remains for me to state the very remarkable facts which form the chief object of this communication. The luminous appearances I am about to describe were observed only when disease had made deep ravages in the system. The following is the statement which first drew my attention to the consideration of this subject:—

"It was ten days previous to L. A.'s death that I first observed a very extraordinary light, which seemed darting about the face, and illuminating all around her head, flashing very much like an Aurora Borealis. She was in a deep decline, and had that day been seized with suffocation, which teased her much for an hour, and made her so nervous that she would not suffer me to leave her for a moment, that I might raise her up quickly in case of a return of this painful sensation. After she settled for the night, I lay down beside her, and it was then this luminous appearance suddenly commenced. Her maid was sitting up beside the bed, and I whispered to her to shade the light, as it would awaken Louisa. She told me the light was perfectly shaded. I then said, 'what can this light be which is flashing on Miss Louisa's face?' The maid looked very mysterious, and informed me she had seen that light before, and it was from no candle. I then inquired when she had perceived it; she said that morning, and it had dazzled her eyes, but she had said nothing about it, as ladies always considered servants superstitious. However, after watching it myself half-an hour, I got up and saw that the candle was in a position from which this peculiar light could not have come, nor, indeed, was it like that sort of light; it was more silvery, like the reflection of moonlight on water. I watched it for more than an hour, when it disappeared. It gave the face the look of being painted white and highly glazed, but it danced about, and had a very extraordinary effect. Three nights after, the maid being ill, I sat up all night, and again I saw this luminous appearance when there was no candle nor moon, nor, in fact, any visible means of producing it. Her sister came into the room and saw it also. The evening before L. A. died, I saw the light again, but it was fainter, and lasted but about twenty minutes. The state of body of the patient was that of extreme exhaustion. For two months she had never sat up in the bed. Many of her symptoms varied much from those of other sufferers in pulmonary complaints whom I had seen, but the general outline was the same. Her breath had a very peculiar smell, which made me suppose there might be some decomposition going forward.

"The fact is certain, the source whence derived authentic, the circumstantial detail clear and conclusive. The person from whom I derived the knowledge of this interesting fact, is one of a clear head, superior power of observation, and utterly exempt from the distortions and exaggerations of superstition. The young lady about whose person these luminous appearances were manifested, I had seen several times before her return to the country; her lungs were extensively diseased; she laboured under the most hopeless form of pulmonary consumption.

"Extraordinary as the foregoing case may appear, it is not without parallel. A few months since, I was in attendance upon a young lady who was in the last stage of pulmonary consumption. She had read in the newspapers a brief notice of the communication which I had, a short time previously, brought before the College of Physicians, upon the evolution of light in the living human subject; and feeling deeply interested in so remarkable a phenomenon, had, more than once during my visits, directed her conversation to that subject. It is no less remarkable that she should in her own person have subsequently exhibited the very same phenomena. The following statement I received from her sister:—

"About an hour and a-half before my dear sister's death, we were struck by a luminous appearance proceeding from her head in a diagonal direction. She was at the time in a half-recumbent position, and perfectly tranquil. The light was pale as the moon, but quite evident to mamma, myself, and sister, who were watching over her at the time. One of us at first thought it was lightning, till shortly after we fancied we perceived a sort of tremulous glimmer playing round the head of the bed; and then recollecting we had read something of a similar nature having been observed previous to dissolution, we had candles brought into the room, fearing our dear sister would perceive it, and that it might disturb the tranquillity of her last moments.

'An appearance of the same kind has been observed round the person and in the room of a man who fell a sacrifice to lingering disease in a remote part of the south-west of Ireland. All the witnesses agree in having seen the light; many, however, have come to the conclusion that it was altogether caused by supernatural agency. Even educated persons have persuaded themselves, and have endeavoured to persuade others, that these luminous appearances, in the room and around the person of this dying man, were proofs of a miraculous interposition, and evidences of divine favour and acceptance. Would it not be well if those who adopt and promulgate such an interpretation of this remarkable phenomenon, were to pause for a moment and consider, first, whether a reference to the known and established laws of nature be not fully capable of accounting for these phenomena; and whether, in the second place, revealed truth be not founded on a basis too firm to need—nay, whether it would not even repudiate the aid of supposed miracles, the purport and object of which it would be no easy task to comprehend?

" Many of the accounts I have received of this case have been written under the influence of the firm persuasion that the light seen arose not from natural, but from supernatural causes. It is certain, however, that a luminous appearance in this instance has been by many distinctly and repeatedly observed. I have been informed by Dr Bull, who resides in Cork, that several of his acquaintance, on the truth of whose statements he could rely, went for the purpose, and saw distinctly the luminous appearances which had excited such general attention in the south of Ireland. An authentic report of this interesting phenomenon having been subsequently published by Dr Daniel Donovan, in the 'Dublin Medical Press,' January 15, 1840, I shall extract from his statement the most important particulars of the case. The name of the patient was Harrington, and he resided in a small but populous village on the harbour of Glandore, one of the most picturesque spots on the southern coasts of Ireland. Dr Donovan states, 'I was sent for in December 1828, to see Harrington; he had been under the care of my predecessor, and had been entered in the dispensary book as a phthisical patient, and on reference to my note-book, I find that the stethoscopic and other indications of phthisis were indubitable. He was under my care for about five years, during which time, strange to say, the symptoms continued stationary, and I had discontinued my attendance for about two years, when the report became general that mysterious lights were every night seen in his cabin. The subject attracted a great deal of attention, and, like every thing else in Ireland, at once assumed a sectarian complexion; some attributing the lights to the miraculous interposition of heaven, others to the practice of the black art. Not regarding these views as offering an explanation of the mystery, I determined to subject the matter to the ordeal of my own senses, and for this purpose visited the cabin for fourteen nights, and on three nights only did I witness any thing unusual—once I perceived a luminous fog resembling the aurora borealis; and twice I saw scintillations, like the sparkling phosphorescence sometimes exhibited by the sea infusoria. From the close scrutiny I made, I can with certainty say that no imposition was either employed or attempted.' Dr Donovan adds, 'I am of opinion that the appearances which I witnessed were dependent on the presence of phosphorescent matter in the expiratory and perspiratory secretions. The property which phosphuretted hydrogen has of undergoing spontaneous ignition when brought into contact with atmospheric air is well known; and as the components of which this is made up exist in abundance in the human body, it is not outstretching the bounds of probability to suppose that it is sometimes generated in the living system.'

" Dr Donovan has lately informed me that the luminous appearances were not at any time visible to him on the person of the patient; the scintillations which he has described above were perceptible immediately over the head of his bed on a wall composed of stone and clay mortar. The luminous fogs passed in streams through the apartment in which the sick man lay, and on one occasion Dr Donovan fancied that he saw a meteor, like a falling star, suddenly pass through the house. Appearances of a similar nature are said to have been seen about the person of a woman named Pallister, who died some time ago in the neigbourhood of Hull; but I have not been able to procure any well authenticated report of the phenomena.*

" For the following very interesting and important fact, I am indebted to Dr William Stokes. I shall give it in his own words:—'When I was residing in the Old Meath Hospital, a poor woman labouring under an enormous cancer of the breast was admitted. The breast was much enlarged, and presented a vast ulcer with irregular and everted edges, from all parts of which a quantity of luminous fluid was constantly poured out. Upon being asked whether she suffered much pain, she answered, 'Not now, sir, but I cannot sleep watching this sore which is on fire every night.' I directed that she should send for me whenever she perceived the luminous appearance, and on that night I was summoned between ten and eleven o'clock. The lights in the ward having been then extinguished, she was sitting leaning forward, the left hand supporting the tumour, while with the right she every now and then lifted up the coverings of the ulcer to gaze on this, to her, supernatural appearance. The whole of the base and edges of the cavity phosphoresced in the strongest manner. The light was steady. I directed that the ulcer should remain open, while I retreated gradually, keeping my eyes fixed on the light, which I found distinctly visible at the end of the ward, which must have been more than twenty feet from her bed. The light within a few inches of the ulcer was sufficient to enable me to distinguish the figures on a watch dial. I have no very distinct recollection of the colour of the light, but I remember that its intensity was variable, it being on some nights much stronger than on others.

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* Can it be that the soft halo of light, thrown around the head by the ancient masters in Scripture paintings, owes its origin to this appearance observed, but never recorded?

" Of all the enumerated sources of phosphorescence in bodies, inorganic or organic, to which do the facts now detailed bear the strongest and closest analogy? Decidedly, I think, to the phosphorescence generated in organic bodies at the period of incipient decomposition. But it may be said, 'can such a state of things exist? Can any process analogous to decomposition take place in the human frame, whilst yet the living principle remains?' Unquestionably it may. For what, after all, is disease? Is it not the first step made toward dissolution? Does it not imply that to a certain extent, however slight that may be, the vital property is impaired and altered, and that unless combated by art, and stayed in its progress by the restorative power implanted in the living system, it will inevitably lead to that condition which gives to the chemical actions the ultimate mastery over the vital?

" Will not this partially impaired power of vital action help to explain the cause of many of those extraordinary solid compounds and fluid secretions which, during the progress of disease, are developed? May not a portion of the living frame be undergoing disintegration, while yet the vital functions, though with impaired energy, maintain their controlling influence over the remainder? I doubt it not; and I do believe that while the flame of life still flickeringly burns on, the diseased or injured part may be reduced to that state which in animal matter is perfectly analogous to the first and earliest stage of decomposition; and, other conditions existing, light may be evolved precisely in the same manner as this phenomenon is produced in the dissecting-room, in burial-grounds, and in marine animals during the early stage of decay. It is not improbable that all cases of this kind may ultimately be referred to one common head—to chemical actions in peculiar conditions evolving light through the instrumentality of electrical phenomena.

" Hitherto few instances of phosphorescence in the higher animals have been observed, or at least recorded; no doubt a luminous appearance has been observed in the renal secretion, and in the ova of lizards, but the evolution of light from the living bodies of the higher animals has generally escaped observation. Between the facts now recorded, and the state of the body when spontaneous combustion takes place, there is a very striking analogy. In one case of spontaneous combustion which is related on good authority, a lambent flame was distinctly seen surrounding the person who suffered from this mysterious and, we may justly call it, dreadful disease; this was observed while the patient was still alive, for he lived for four days after the occurrence of the spontaneous combustion, and was able to give an accurate account of his earliest sensations. This is an important fact, and bears directly on the subject we are discussing; before internal combustion can take place, the vital property must have nearly lost its controlling influence, as already explained, and chemical action, before death, must have begun to predominate. This explanation is corroborated by the following case, which is of recent date. A man, ill for fourteen days, was admitted by M. Bally into the Hotel-Dieu: he died on the night after his admission, and on examination eight hours after, exhibited the following appearances:—The whole surface of the body was emphysematous, of a violet colour, and studded with a vesicular eruption in detached spots, the vesicles being filled, some with a reddish serum and gas, others with gas alone, the latter being of a white colour. The abdomen was also much distended, the gas occurring not within the intestines, but in the cavity of the peritoneum. Upon cutting into any emphysematous part, a gas escaped, which was set on fire by the flame of a candle; and from a perforation made in the abdomen a gas issued, which was ignited in a similar manner, and burned with a bluish flame.

"This case, which was communicated to the Académie Nationale de Médecine, excited a good deal of discussion, and was considered by many as proving that the putrefactive process, from which alone they conceived the gases could be derived, may set in before death."

Case of Fistula of the Pharynx. By Professor ALBERS of Bonn. (*Archives Generales de Medecine*, April 1842.)—In one of the battles with the Arabs in the neighbourhood of Algiers, in 1836, a man was wounded in the throat, by a sabre thrust, a little above the hyoid bone. The soft parts were cut so as to expose the epiglottis and interior of the pharynx. The base of the tongue was consequently drawn upwards, whilst the larynx, from not being connected with the jaw, was drawn strongly downwards. He lost much blood, and became insensible, in which state he remained for eighteen days. The usual means had been used to procure adhesion of the surfaces, but had failed to effect this, so that the wound remained in the state of fistula. As this large fistulous opening prevented both from speaking and swallowing, it was endeavoured to close it artificially by means of sheet-lead held in its place by a plate of silver; but his food escaped between the wound and the plate of silver. At present he covers the wound with a piece of leather, which is firmly retained in its place by a proper bandage, and by this means he is enabled to speak and swallow with tolerable ease.

The fistulous opening is at present of an irregularly rounded shape; measuring one inch in its greatest width, and two inches in its greatest height. Its margins are covered by a membrane, which appears to be regularly organized. This opening allows the epiglottis and the two pillars of the arch of the palate to be distinctly seen. The larynx also is seen at the lower part, of a roundish form, where it appears to have contracted a close adhesion to the hyoid bone. The cellular tissue and perichondrium of these parts appear to be tumefied. He can swallow his spittle, even when the fistulous opening is free; but not food of any kind unless the opening be firmly closed or plugged. Speech is possible, even when the opening is free, the man being capable of articulating the labial and lingual letters; but, on the whole, so confused, that it is impossible to comprehend what he says. When the opening is closed the voice is loud, and he articulates distinctly. He cannot cough unless the opening be closed, neither can he expectorate till this be done. When the opening is free the man breathes through this alone, no air passing either by the mouth or nasal fossæ. This fistulous opening appears to have had no hurtful influence on the state of his health, he having continued to serve in the army for two years after it existed, and being at present robust and in good health.

On the presence of Fibrine in the serosity extracted from the Peritoneum. By M. De la HARPE. (*Arch. Gen. de Med.*, June 1842.)—M. de la Harpe, wishing to examine the serous fluid drawn off from the peritoneal cavity of a dropsical patient, left it for some time in an open vessel, and on his return found it converted into a gelatinous-looking mass. He found this appearance was produced by the preeence of a fibrinous matter, closely resembling, if not identical with, the false membranes thrown out during inflammation. When portions of the clot were allowed to contract spontaneously, or were compressed, the resemblance was complete, and neither by chemical nor physical examination could any sensible difference be discovered.

In examining the serous fluid drawn off from several other dropsical patients, he procured undoubted traces of the presence of fibrine. If the serous fluid was collected in an open vessel, and stirred with a feather, fibrinous threads were brought out attached to the feather. But, if a considerable time was allowed to elapse, the whole became a trembling coherent mass which the feather could not penetrate. When detached from the sides of the vessel, the mass contracted, and expressed the serum. The examination of the clot showed it to present all the characters of fibrine.

On the Connection which exists between Delirium and certain states of the Heart. By Dr ALFRED HUDSON. (*Dublin Journal of Medical Science*, November 1841.)—Dr Hudson arrives at the same conclusions relative to the treatment of typhus as Dr Stokes, in as far as the administration of wine is concerned, viz. that the diminution of the impulse of the heart, and the feebleness or almost complete absence of the first sound, indicates the absolute necessity of the administration of stimulants in the shape of spirituous liquors. Cerebral symptoms were the dominant peculiarities of the epidemic typhus of 1840; and during life two distinct and different forms of the disease were observed, the one characterized by feebleness of impulse, and diminution, or even complete absence, of the first sound of the heart,—the other, by strong impulse, and strong and distinct sounds. On dissection of the one class were found softening of the substance of the heart, and venous congestion of the brain, and it was these cases which required the stimulants; in the other, the substance of the heart was firm and contracted, and the arteries of the brain were injected with blood: and it was in this class that depletive measures proved of the greatest utility.

Researches on Cancer. By M. TANCHON. (*Comptes Rendus des Seances de l'Academie des Sciences*, 16th May 1842.)—M. Tanchon made a number of direct experiments on the contagious nature of the purulent matter of cancer, by inoculating animals with it. From these it appears that cancer cannot be communicated by contagion. He hence concludes, that cancer is not the result of an acrid humour or principle in the blood, and the remedy for its cure must be sought for in agents which act in modifying the vascular and nervous system, and not among agents which might be termed antidotes.

On the Sanatory condition of Paris during the first six months of 1842.

By Dr Jules Guerin. (*Gazette Medicale de Paris*, 6th August 1842.)—In an interesting paper M. Guerin shows the relative mortality from all diseases during the first six months of 1842, as compared with those of 1841. The following table will best explain this. It enumerates the number of cases received, and the deaths which occurred in all the Parisian hospitals during the mentioned period.

	1841.		1842.	
Remaining on 31st Dec.	5,430	Deaths.	5,160	Deaths.
Admitted in January,	6,290	593	6,550	570
„ February,	5,772	539	6,099	566
„ March,	6,689	632	6,630	673
„ April,	6,503	664	6,859	706
„ May,	6,931	659	6,877	674
Total,	37,615	3,087	38,175	3,189

This gives a general mortality of about one death in somewhat less than 12 cases for the first six months of 1841, and one death in a fraction more than 12 cases during the like period of 1842. It is stated that the general mortality during the four last months of both of these years was about one death in 16 cases. The deleterious action of atmospheric influences was more especially remarked on the very young and the aged. The following table, including the number of the patients, and the deaths which occurred in all the Parisian hospitals devoted to the cure of diseases of children, and of the aged, shows this. For the sake of comparison the tables are given for 1841 and 1842.

	1841.		1842.	
	No. of cases.	Deaths.	No. of cases.	Deaths.
Remaining 31st Dec.	10,502		10,070	
Admitted January,	869	331	974	332
February,	954	267	936	275
March,	1,090	266	1,099	309
April,	952	344	1,085	337
May,	967	199	980	382
Total,	15,334	1407	15,144	1635

Thus it appears, that, of the very young and the aged, there died in the ratio of 1 to 11 for 1841, and of 1 to 9 in 1842; and the meteórological tables which are appended show, that the last winter months and the first spring months of 1842 were more severe than those of 1841.

Puerperal fever seemed to follow the same general rule as other diseases, in so far as the mortality from it was concerned, as, both during the first six months of 1841 and of 1842, the chief mortality occurred during the month of April. The following table exhibits the number of deaths from puerperal fever, as compared with the number of deliveries in all the Parisian Lying-in-hospitals, during the first six months of 1841 and 1842.

	1841.		1842.	
	No. of deliveries.	Deaths	No. of deliveries.	Deaths.
January,	310	13	329	7
February,	295	9	308	12
March,	327	15	335	32
April,	281	46	334	55
May,	318	7	286	35
June,	288	4	236	7
Total,	1819	94	1828	148

THERAPEUTICS.

Notice of first Employment of Mercury as a Remedy in Inflammatory Disorders. By Dr JOHN B. BECK. *(In Annual Address delivered before the Medical Society of New York,* 1st February 1842.)—It has been usually stated in this country, that the employment of mercury, at least in the form of calomel and opium, as an adjuvant in the treatment of various inflammatory disorders, was first practised by Dr Robert Hamilton of Lynn Regis. From the account published by Dr R. Hamilton in 1784, Medical Commentaries, ix., he appears to have first commenced this practice about the year 1764, but he makes no mention whether he derived the knowledge of the practice from any other person.

According to the account of Dr John B. Beck in the present address, this practice was of American extraction, and took its origin as far back as the year 1736, and the credit of originality is generally conceded to Dr Douglass, a physician of Boston, by whom it was used in the *angina maligna* which prevailed extensively over the colonies at that period, and committed the most dreadful ravages.* By Dr James Ogden, a respectable physician of Long Island, this practice was extensively applied in the same disease about the year 1749.† The preparation of mercury which was used was calomel. In consequence of the success which attended the use of this remedy in this disease, it was shortly after resorted to in other inflammatory complaints; and about the middle of the last century, it was in common use in this country in pleurisy, pneumonia, rheumatism, and others of the phlegmasiæ. Dr Beck is aware that the credit of this practice is claimed elsewhere;‡ but from the facts now mentioned, he thinks that there can be no doubt that in its origin it is exclusively American, and that to the physicians of the United States the world is indebted for this great improvement in practical medicine.

Skate-liver Oil preferable as a Therapeutic agent to Cod-liver Oil (Journal de Pharmacie, June 1842.)—The disagreeable odour and taste of cod-liver oil has, it would appear, led to the substitution of the oil obtained from the liver of the skate *(Raia clavata* and *R. batis)* in place of it. In Holland and Belgium this oil is preferred to that of the cod, as being both less disagreeable to the taste internally, and also fully more efficacious in its therapeutic effects. MM. Girardin and Preisser were therefore induced carefully to analyze it, and found it to contain a per centage more of the ioduret of potassium than the cod-liver oil, whilst, in point of purity and other properties, it appeared to be superior to it. They therefore recommend it as a valuable substitute for the more nauseous article at present in use.

On the employment of Ergot of Rye in cases of Paraplegia. By M. PAYAN of Aix. *(Journal de Pharmacie,* June 1842.)—In consequence of a number of experiments which he performed, M. Payan arrived at the conclusion, that the ergot of rye does not simply excite contraction in the uterine fibres, but also in those of the bladder, rectum, and lower extremities, when these parts are in an asthenic state. As he was unable to account for this action on parts so different, he referred its therapeutic effects to a specific action exercised on the lower portion of the spinal marrow, and was hence induced to make use of it in cases of paraplegia of the lower extremity, where that state seemed to be induced in consequence of suspended or enfeebled action of the spinal marrow, but without structural disease.

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* New England Journal of Medicine, Vol. xiv. p. 4.

† New York Med. Repository, Vol. v. p. 97.

‡ Dr John Armstrong, in his work on Typhus, gives the sole credit of this practice to Dr Robert Hamilton of Lynn Regis. In another place, I have shown the incorrectness of this statement. (See New York Medical Gazette, No. 1.) From the account of Dr Hamilton himself, it appears that his attention was not called to the practice until the year 1764; whereas it had been in very general use in this country many years before.

M. Payan relates three cases of paraplegia which had resisted the ordinary means of cure, which were removed by means of the continued use of the ergot of rye. His mode of administration was to give 15 grains of the powder of ergot every morning, and gradually increase the dose to 30 grains. Irritant liniments were at the same time rubbed along the spinal column. No deleterious effects seem to have followed the continued administration of this medicine in any case. The first was cured within a month, the second by the eighteenth day: the period of cure of the last case is not mentioned. In some cases he has administered large doses for a month and a half; and in the case of a girl of five years of age, he says he has administered from 10 to 20 drachms in the course of fifteen days without producing any inconvenience.

On the Efficacy of Injections of Infusion of Cubebs in Vaginitis. By M. PIORRY. (*Gazette des Hopitaux*, May 1842.)—A woman, 23 years of age, had suffered for nine months from an intense *urethro-vaginitis*, attended with acute pain, and an abundant discharge. She had tried every usual remedy for its removal without success. M. Piorry ordered an injection made with one ounce of cubebs powder, infused in one pound of water, to be thrown into the vagina six times daily. In two days the discharge had greatly diminished; but the inflammation in the urethra remained intense as before. She was therefore ordered to take 45 grains of powder of cubebs every hour, and in twelve days the pain and discharge had entirely left her, and she was dismissed cured.

Case of Recovery from Poisoning with Corrosive Sublimate. By M. VAUTIER. (*Journal de Pharmacie*, April 1842.)—A man aged 68, in a fit of despair, bruised down about a drachm of corrosive sublimate, put it into a ripe pear, and swallowed it. He soon after began to experience a severe smarting in his throat, and a burning sensation in his stomach, followed by vomiting. When first seen about three-quarters of an hour after swallowing the poison, his face was pale, with an expression of anxiety and suffering, his limbs were cold, and continually tossed about, and the pulse was small, but hard and intermitting. The matters which he vomited had a whitish appearance, were tenacious like albumen, and stretched in long strings from his mouth, and were mixed with portions of the pear. Emetics were freely administered, after which he had the white of six eggs, which he also vomited. After this, no other medicine was given; he was simply confined to barley-water, and in three days he recovered. M. Vautier attributes the speedy recovery to the corrosive sublimate having been taken in the solid form, and along with food. As soon as the natural fluids of the stomach had dissolved any portion of the poison, and allowed it to come in contact with the stomach, vomiting was excited, and the greater portion of the poison expelled before it could exert its full power on the system.

On a very simple mode of arresting Hemorrhage from the Nose. By Dr NEGRIER of Angers. (*Archives Generales de Medecine*, June 1842.)—Dr Negrier states that the following very simple plan almost invariably succeeds in arresting bleeding from the nose: The child is made to stand erect, with the head elevated. The nostril from which the blood flows is compressed by means of the fingers, and the corresponding arm is directed to be raised perpendicularly, and be retained in that position for about two minutes. The hemorrhage in general was arrested in ten seconds from the moment of raising the arm. Dr Negrier has met with eleven cases of epistaxis, five of which he details, which were cured by this simple means; and he states, that, whether the hæmorrhagy was due to a general plethora, or to a temporary congestion of blood in the head, the sudden elevation of the arm corresponding to the nostril from which the blood flowed almost always suspended the bleeding. Two or three times only he has seen the epistaxis return; but it always ceased on the elevation of the arm. It never, however, returned if the person had lost six to nine ounces of blood before the treatment was had recourse to.

One case is related where a bleeding, resulting from a slight incision of the skin of the upper lip, was arrested by the same simple means. This case was the more remarkable, as the bleeding would not stop though the wound was covered by court plaster, and freely cauterized with the solid nitrate of silver. On raising the two arms perpendicularly the bleeding was arrested on the instant, but restored as soon as they were lowered; but on maintaining them in the perpendicular position for about a couple of minutes the bleeding was definitively arrested.

SURGERY.

False Joint of Humerus treated successfully by the Seton. By M. Baroni. (*Bulletino delle Scienze Mediche,* Jan. 1842.)—A man, 37 years of age, fractured his humerus; but, in consequence of mismanagement, and the fractured extremities not being kept in apposition, nor any means used to keep the limb steady for sixteen days, a false joint was the consequence. The fracture was found to be oblique, and the extremities of the bone passed each other. The limb was held extended so as to separate the fractured extremities, and a long needle, armed with a skein of cotton, was passed between the extremities of the bones, and the seton left there. Little inflammatory action was excited; and the limb being imperfectly secured, some weeks passed, and still the fractured extremities were disunited. Feverish symptoms, however, soon after this supervened, attributed to exposure to cold; inflammatory symptoms attacked the wound, the discharge of purulent matter became abundant, and a phlegmonous tumour formed in the axilla. The arm was now more securely fixed, osseous matter was thrown out, and within two months the seton was withdrawn, when the wound rapidly healed, and the fractured surfaces became firmly united.

TOXICOLOGY.

Poisoning by Cyder containing Lead in Solution (*Annales d'Hygiene Publique,* January 1842.)—Six individuals, after drinking cyder for a few days, were seized with the usual symptoms of poisoning by lead, as violent colic, obstinate constipation, pains in limbs, with the attendant trembling. They recovered under the usual remedies. MM. Chevallier, Olivier, and Pages were directed to investigate into the mode in which the cyder had become adulterated with lead, and found, that, during its preparation, it had been allowed to remain for two days in a reservoir which was lined with lead. They also recognized that the salt of lead which existed in the cyder was a malate, which they found to be a soluble salt. The only interest of this case depends on this circumstance, as both Thomson and Berzelius describe the malate of lead as an insoluble salt; and it is well that chemists should be aware of the fact of its solubility.

Case of Poisoning by the Binoxalate of Potash. (*Comptes Rendus des Seances de l'Academie des Sciences,* April 1842.)—A lady recently confined was ordered one ounce of the bitartrate of potash; but the apothecary sent by mistake that quantity of the binoxalate of potash, divided into two doses. One dose, or nearly half an ounce, was immediately swallowed, but had scarcely reached the stomach, when she was seized with excruciating pains, followed by violent convulsions, and death within ten minutes after swallowing the draught.

On opening the body twenty-four hours after death putrefaction was found to have commenced on all the lower parts of the abdomen. The mouth, the pharynx, and the œsophagus were in their natural state. The orifices of the stomach were hermetically closed, in consequence of the contraction of the circular fibres which surround them. The mucous membrane of the stomach presented the appearance of violent inflammation. The duodenum and small intestines presented the same appearances. The blood was fluid in the heart and great blood-vessels.

Another case is related where death also resulted from taking for three consecutive mornings a teaspoonful (holding about 1 drachm 16 grains) of the same salt. It produced severe vomiting after each dose, and death within an hour after taking the third dose. The body was not examined.

MISCELLANEOUS.

Medical Graduations at Edinburgh.—On the 1st of August 1842, the Senatus Academicus of the University of Edinburgh conferred the Degree of Doctor of Medicine on the following gentlemen, in number eighty-seven, after having gone through the appointed examinations, and defended publicly their Inaugural Dissertations.

OF SCOTLAND.

Charles A. Anderson, on Rheumatism.
David Anderson, on the Mechanism of Vomiting.
Alexander Barclay, on the Structure and Functions of the Placenta.
John Barclay, on the Spleen in Intermittent Fevers.
Wm. T. Barker, on Acute Gout.
Samuel Brown, on Asthma.
Edward Chapman, on Uterine Hæmorrhage.
John Clerk, on Tabes Mesenterica.
James M. Cowan, on Delirium Tremens.
David Ferguson, on Delirium Tremens.
Alexander Forteath, on the Influence of Food and Climate on the Colour and Clothing of Animals, more particularly of Birds,
William Fraser, on Hydrophobia.
John M. Grant, on Emphysema.
Richard Hair, on Inflammation of the Liver.
Robert Jackson on Asphyxia by Submersion.
John Johnstone, on Syphilis.
John Gib Laing, on Delirium Tremens.
James S. S. Logie, on the Ordinary Stethoscopic Diagnosis of Pregnancy.
Richard J. Mackenzie, on Practical Observations on Injuries of the Head.
George Ogilvie, on the Analogies of Plants and Animals.
Andrew Pringle on Placenta Presentation.
William L. Reid, on Strabismus.
James Robertson, Observations on Nervous Agency.
John R. Skinner, on the Diseases of the Conjunctiva.
William Smellie, on the Vascular System, and the Circulation of the Sap in Vegetables.
John Young Smith, on the Varieties of the Calculus Diathesis, and their Urinary Deposits.
John Wilson, on Inflammation of the Liver.

FROM ENGLAND.

Charles Andrews, on the Principles applicable to the Treatment of Fractures of the Extremities.
John Wyat Barnard, on Rubeola.
Edward Wm. Bawtree, on Delirium Tremens.
Thomas Berryman, on Pneumonia.
Newton Blyth, on Tubercular Con-

sumption, its Nature, Causes, and Treatment.
S. Budd, Remarks on the Causes and mode of Propagation of Typhoid Fevers.
William Camps, on Pneumonia, its Pathology and Treatment.
Henry T. Castle, on some of the Diseases of the Joints.
Joseph Dickson on Crural Phlebitis.
Walter Fergus, Contributions to the Vital Statistics of English Paupers.
Charles Ford, on Bronchocele.
Thomas Gillham, on the Physiological and Therapeutic Actions of the Narcotic Umbelliferæ.
George Henderson, on the Forms, Diagnosis, Causes, and Treatment of Dysentery.
Ralph Clayton Hislop, on the application of the Numerical Method to the Science of Medicine, but more especially to Therapeutics.
William Thomas Hoskin, on Strictures of the Urethra.
John Hulbert, on Crural Hernia.
William Jollie, on Puerperal Convulsions.
William Marwood Kelly, on the Influence of Age on Diseases.
John Stewart Lamb, on the Importance of the Study of Meteorology.
John Lambert, on Scarlatina.
William Mort, on Chorea.
John Howard Norton, on Organic Chemistry in its Connection with Animal Physiology,
Thomas Beville Peacock, on Three Cases of Chronic Pleurisy.
Thomas Bailey W. Potts, on a report of 104 cases of Midwifery, with remarks.
William Robinson, on the Primary forms of Bronchitis.
John Wagget, on Generation.
Charles F. Warneford, on the Inflammatory diseases of the Thoracic Viscera.
John White, on the Physiology of Circulation.
Corbett Whitton, on the History, &c. of Monkshood.
Joseph Wickham, on Croup.
George Harvey Williams, Observations on the Forms and Treatment of Diseases in general.
Francis Henry Woodforde, on the Nature and Treatment of Scrofula.

FROM IRELAND.

John Bennett, on Monomania.
Richard Blennerhassett, on Urethritis Venerea.
Michael Cussen, on the Typhoid Fever of Paris and Wales.
Arthur Donnelly, on Scarlatina.
William V. Drury, on Insanity.
William Gordon, on Pneumonia.
Charles Hill, on Acute Rheumatism.
Andrew G. Malcolm, on the Pathology of continued Fever.
Benjamin W. Marlow, on the Spermatozoa.
James Moore, Can acquired Habits and Physical Configuration of Body descend to the Offspring?
Thomas Moorhead, on the Treatment of Syphilis.
Arthur Ross, on Lead.
Hugo Smith, on Hæmorrhage.
William Smith, on the Cultivation of Medical Science.
John Smith, on Ascites.
John A. W. Thomson, on Asthma.
Thomas Bell Wright, on Iodine, its Chemical Properties, &c.

FROM GIBRALTAR.

Thomas B. Johnstone, on Fractures in General, and their mode of reunion.

FROM SMYRNA.

Vans Christian Clarke, on the History and Nature of the Plague.

FROM ISLAND OF MADEIRA.

Antonio J. Moderno, on soms Dis- of the Brain, more particularly Apoplexy.

FROM NEW BRUNSWICK.

John Bedell on Synochus.

FROM THE WEST INDIES.

Frederick Duncome, on Delirium Tremens.

FROM THE ISLAND OF BERMUDA.

Henry Joseph Hinson, on the Symptoms, Causes, Diagnosis, Treatment, &c. of Aneurisms.
Park Benjamin Tucker, on the Nature and Treatment of Uterine Hæmorrhage.

FROM BARBADOES.

Alleyne Maynard, on Ichthyosis.

FROM THE EAST INDIES.

James Stuart Morrieson, on Dysentery.

James Wm. George Wyse, on Acute Hydrocephalus

FROM AUSTRALIA.

Francis Wemyss Irvine, on Solution.

Report of the Council of the Provincial Medical and Surgical Association.—This year, this excellent public-spirited association met at Exeter, and there held their ninth anniversary meeting on Wednesday the 3d, and Thursday the 4th of August.

The part of the report of most general interest is that relating to medical reform, and the giving medical relief under the New Poor Law.

During the past year the subject of medical reform has continued to be discussed by the profession, and your council have endeavoured to give an unbiassed consideration to several propositions that have been submitted to them. They have, however, thought they should best discharge the duties entrusted to them by adhering, as strictly as circumstances would permit, to the principles which have been recognized at the several anniversary meetings when this question has been discussed; and it may be as well to remind this meeting, that at the last anniversary a memorial was agreed to and directed to be forwarded to the Government, in which the association forcibly points out many of the evils that have resulted to the public and to the profession from the want of a suitable legal organization, which, they maintain, can only be obtained by the intervention of the Legislature; and they consequently desire that a well-formed bill be submitted to the senate; but they go on to observe, that much importance attaches to the source from which such a bill should emanate. Speculative reformists, from a too ardent zeal to realize speedily all their conceptions, would be liable to seek too much. Existing institutions, on the contrary, if entrusted with the framing of a bill, would concede too little. In this emergency, it is most desirable that any bill for reforming the medical profession, for calling forth its full energies, and adapting it to the necessities of all classes of the community, should issue from those who would be untrammelled by either extreme party, namely, the Ministers of the Crown.

It is highly gratifying to find that the course recommended in the above Memorial has been adopted by her Majesty's Government. Early in the present Session of Parliament, the Secretary of State for the Home Department announced that a Bill for Amending the Polity of the Medical Profession was in a forward state, and he was not without hope that he might be able to submit it to the House of Commons before the prorogation of Parliament. This announcement was, as might be expected, received by the profession with every mark of satisfaction, and much speculation was immediately called forth as to the nature of the provisions of the proposed bill. Your council could not fail to see that an important crisis had now arrived, as upon the nature of the proposed bill the future destiny of the profession in a measure depended; and they therefore, after having met several times and considered the question, thought it right to address Sir James Graham, and to inform him what the principles were that have been maintained at the successive anniversary meetings of this numerous and influential association. They therefore, on the 5th of March, unanimously resolved to send the following memorial to the Right Honourable Secretary of State:—

"We, the undersigned members of the council of the Provincial Medical and Surgical Association, respectfully beg leave to offer you our thanks for the declaration made by yourself in the Commons House of Parliament that her Majesty's Government are about to bring a bill into Parliament for the better regulation of the medical profession.

"That this duty might be undertaken by her Majesty's Government was the hope expressed by the very numerous body whom we have now the honour to represent, at their late anniversary meeting holden at York, in the month of July last; and it will perhaps be in your recollection that a memorial to that effect, having been adopted at the meeting, was subsequently laid before you.

"To the principles expressed in that memorial we take the liberty of again drawing the attention of yourself and your Right Honourable Colleagues, embodying as they do the sentiments and wishes of a very large and influential portion of that profession, for the welfare and protection of which you have been pleased to signify your intention to provide.

"The evils complained of by the members of the medical profession, in the redress of which it should be observed the general community as well as the medical profession are deeply interested, are the imperfections and unequal character of the existing methods of qualification for medical licences and degrees, and the inefficiency and exclusiveness of the existing medical corporations, together with their want of power to afford protection to the public and to the medical profession against the arts of unqualified and ignorant pretenders.

"In applying to her Majesty's Government for redress of these evils we are desirous neither of injuring existing Institutions nor of abrogating those distinctions in the profession which we believe to be useful to the public service. But we feel that we should be guilty of a dereliction of duty if we did not express respectfully, but firmly, that unless the present Medical Corporations shall undergo extensive changes in their constitution, they can never become fitted for the government of the profession at large, seeing that they have not hitherto secured the confidence of its Members.

"We beg leave to express our opinion that the Members of the Medical Profession, not only in consideration of the character of their education, but in accordance with the general Institutions of the country, are entitled to elect Medical Members of the Councils, or of the Corporations to which they severally belong; and that any measure which shall fail in securing to them such a privilege will be felt as the denial of a right to which they think they have a just claim.

"The principles to which we are desirous of calling your attention, as being those recognized by the Provincial Association, and upon which as we conceive any measure intended for the regulation of the medical profession should be founded, are *uniformity of the primary qualification*, to be tested by sufficient examination; *equal right*, in every member of the profession, to practice throughout her Majesty's dominions; and *the adoption of the representative system* in the formation of the councils or governing bodies.

"In submitting these views we are assured that we express the wishes not only of the numerous association with which we are ourselves connected, but also those of a very large number of our professional brethren throughout the country."

The receipt of this memorial was politely acknowledged by Sir James Graham, but his letter contained no information as to the nature of the bill which it was understood the Government was intending, without much delay, to introduce into the House of Commons. It therefore became a question whether it would not be desirable still further to urge upon the attention of the Government the principles of medical reform which had been adopted by this association; and as several letters were written to the council, pointing out that some good result might arise from a deputation of members being appointed to have a personal interview with the Home Secretary, the council met again on the 26th of March, and unanimously resolved, "That it appears expedient to this council that a deputation, consisting of six members of the association, should seek an interview with the Right Honourable Sir James Graham, and explain to him the views which are entertained by this association on the subject of medical reform, and request his attentive consideration of the same."

The deputation, however, did not go up to London, for within a short space of time after the above meeting, it became generally known, by a communication from the Secretary of State to Dr Webster, that it was very doubtful whether the state of public business would permit the Government to legislate on medical affairs during this session of Parliament. This being the case, it appeared to the council far better that the deputation should directly emanate from the anniversary meeting, as thereby the whole weight and influence of the association would be brought more immediately to bear on the question. It remains, therefore, for the members present to decide upon the course now to be pursued, in which they will doubtless be assisted by the reform committee, who have given due consideration to the information which has been more lately communicated upon this question, and who are prepared with a report to be read at this meeting.

Poor Law Medical Relief.—It has been the aim of the association, ever since the year 1836, to obtain some legislative enactment for the better regulation of medical relief for the poor. To this object the attention of the council has been specially directed during the past year.

The publication of the reports of your poor law committee, and their extensive circulation among members of Parliament and other influential persons, although involving the association in considerable expense, were deemed essential preliminaries to any Parliamentary discussion on the question.

In accordance with the advice of Mr Serjeant Talfourd, your Council communicated in January last with Sir Robert Peel and Sir James Graham, and requested their consideration of the principal statements and suggestions of your Poor Law Committee.

The distinguishing features of the several plans proposed by that Committee were laid before Her Majesty's Ministers, who expressed their thanks for the information thus afforded, and promised particular attention to the subject, but declined pledging themselves to any Parliamentary measure.

Anxious to obtain the assistance of all who might be endeavouring to promote an equitable settlement of this question, your Council requested the co-operation of the President and Council of the London College of Surgeons. The Secretary of that body stated, in reply, that the President had conferred with the Commissioners, and hoped to effect an amendment of the system. The College, therefore, declined to assist in bringing the subject before Government or Parliament, and recommended the Association to refrain from further proceedings until after the publication of the alterations then about to be made by the Poor Law Commissioners, which the College believed would " be found to redress nearly the whole of the grievances of which the medical officers of Unions have complained."

Shortly after the propositions of this Association had been submitted to the Government, the Poor Law Commissioners published and circulated their new Medical regulations, obviously the result of the long-continued efforts of the Medical Profession. The advantages and defects of these regulations have been considered in the late Special Report of your Poor Law Committee, which was adopted by your Council, and is now in the possession of every Member of the Association.

Acting on the suggestions contained in that Report, your Council again memorialized the Secretary of State, soliciting him to introduce such provisions into the Poor Law Amendment Bill as might remove the remaining imperfections of the medical arrangements. This application has been politely acknowledged; and from an important communication very recently made to your Council, they have reason to believe that the appeals of this Association, together with the personal exertions of the late President of the London College of Surgeons, have induced the Secretary of State to accede to the augmentation of the salaries of Union Medical Officers.

In the absence of definite information respecting the intentions of Government it would be obviously premature to pronounce an opinion on the expected improvements; but your Council feel persuaded that there can be no adequate security for an efficient and satisfactory administration of this department of the public service, until it be placed, partially at least, under the superintendence and direction of medical authorities.

The attainment of this object, therefore, in connection with other Legislative provisions for the public health, demand the continued and vigilant attention of the Association. Meanwhile, your Council congratulate the members upon what has been effected, and hope that the wide diffusion of correct views and right principles which they have been instrumental in promoting, may in the end produce further results, alike advantageous to the members of our profession, and gratifying to every humane and philanthropic mind.

Benevolent Fund.—The Council regret to say that the Benevolent Fund has not yet been enabled to resume its operations in conformity with the resolutions passed by the Association at Southampton in 1840. Great exertions have, however, been made during the past year, and the Central Committee confidently anticipate that in a short time they will again be able to fulfil the benevolent intentions of the donors and subscribers to the fund. A more detailed account of the state of the fund will be given in the Report, to be presented to the meeting by the Central Committee.

Congratulatory Addresses to the Queen, &c.—Since the last Anniversary the birth of H. R. H. the Prince of Wales has occurred, and this auspicious event could not fail to call forth from the Medical Profession, as well as from all classes of Her Majesty's subjects, the most lively expressions of joy and gratitude; and your Council felt that the occasion demanded that the Association should testify in an appropriate manner the participation of the Members in the general rejoicing. Congratulatory Addresses have accordingly been presented to Her Majesty, and to H. R. H. Prince Albert.

District Branches.—Your Council have to report the formation of two District Branches: one at Hull, called the East York District Branch; and the other at York, called the York District Branch. The rules by which these Branches are governed are similar to those of the Branches which were before in existence. It is also right to observe, that the Bath and Bristol Branches are united into one Branch, which is now the Bath and Bristol District Branch.

Conclusion.—Your Council are deeply solicitous for the progressive advancement of the Association,—a result which can only be insured by the united endeavours of the members to promote the objects for which we associate, namely, the increase of medical knowledge, and the maintenance of the honour and respectability of the profession generally in the Provinces, by promoting friendly intercourse and free communication of its Members, and by establishing among us the harmony and good feeling which ought to characterize a liberal profession.

It cannot be denied that the prosecution of such objects must be beneficial, and exert a salutary influence in obtaining for our noble profession that proud position in public estimation which as a class we are entitled to occupy. Indeed the successful prosecution of these objects will do more for us than any legislative enactments can effect, for it will bind us together by the ties of mutual regard and kindness, and will enable us, under all vicissitudes of life, to cherish the consoling reflection, that we have unremittingly endeavoured to render the art of medicine more perfect, and consequently ourselves more instrumental, in administering relief to the sickness and sorrow of our fellow-men.

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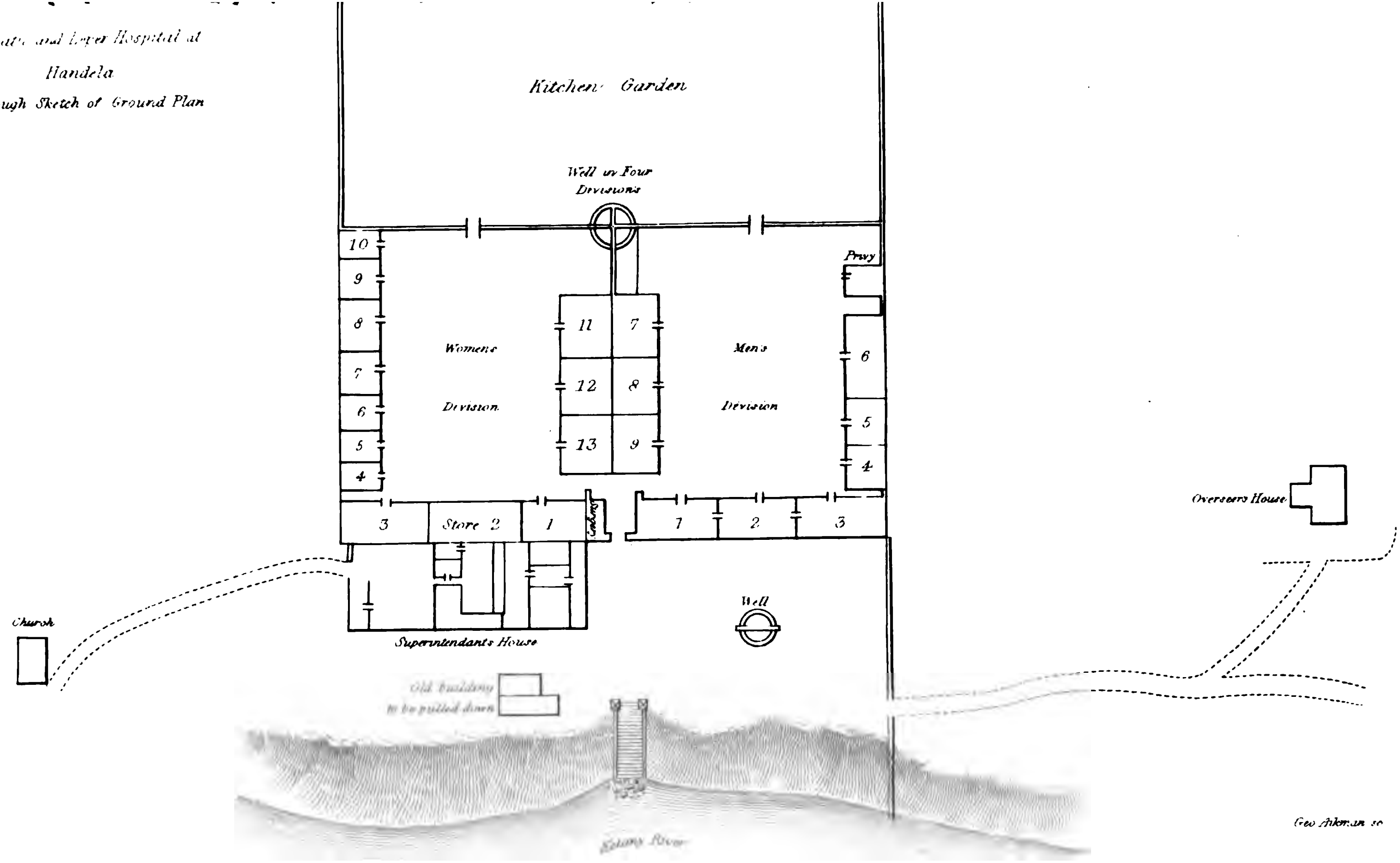
Lunatic and Leper Hospital at
Handela
Rough Sketch of Ground Plan



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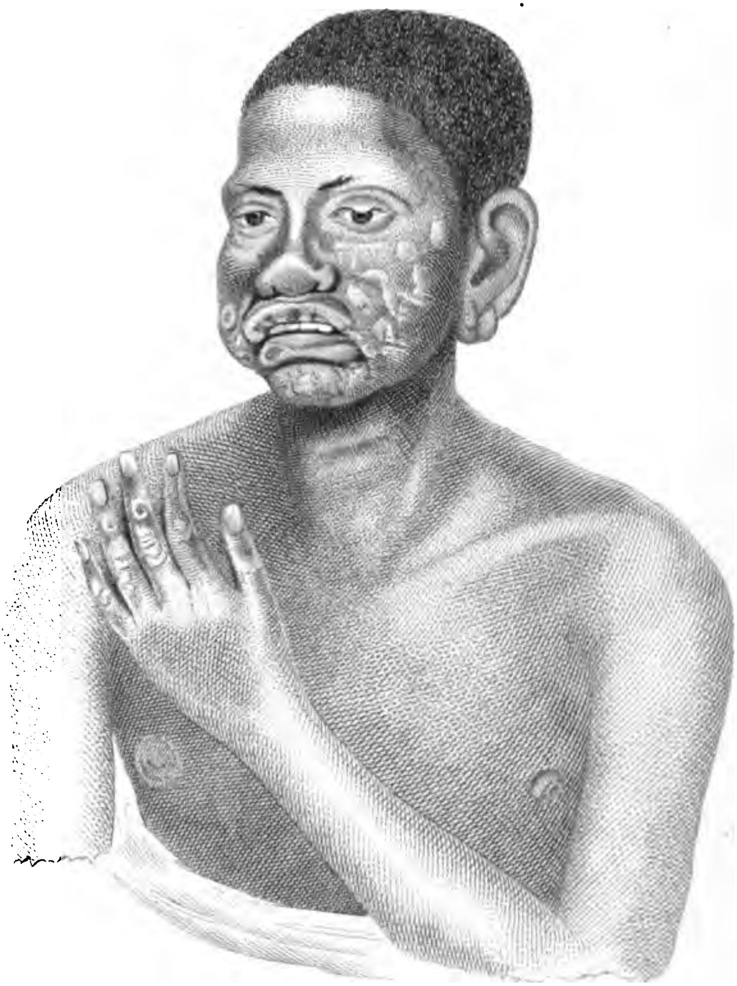

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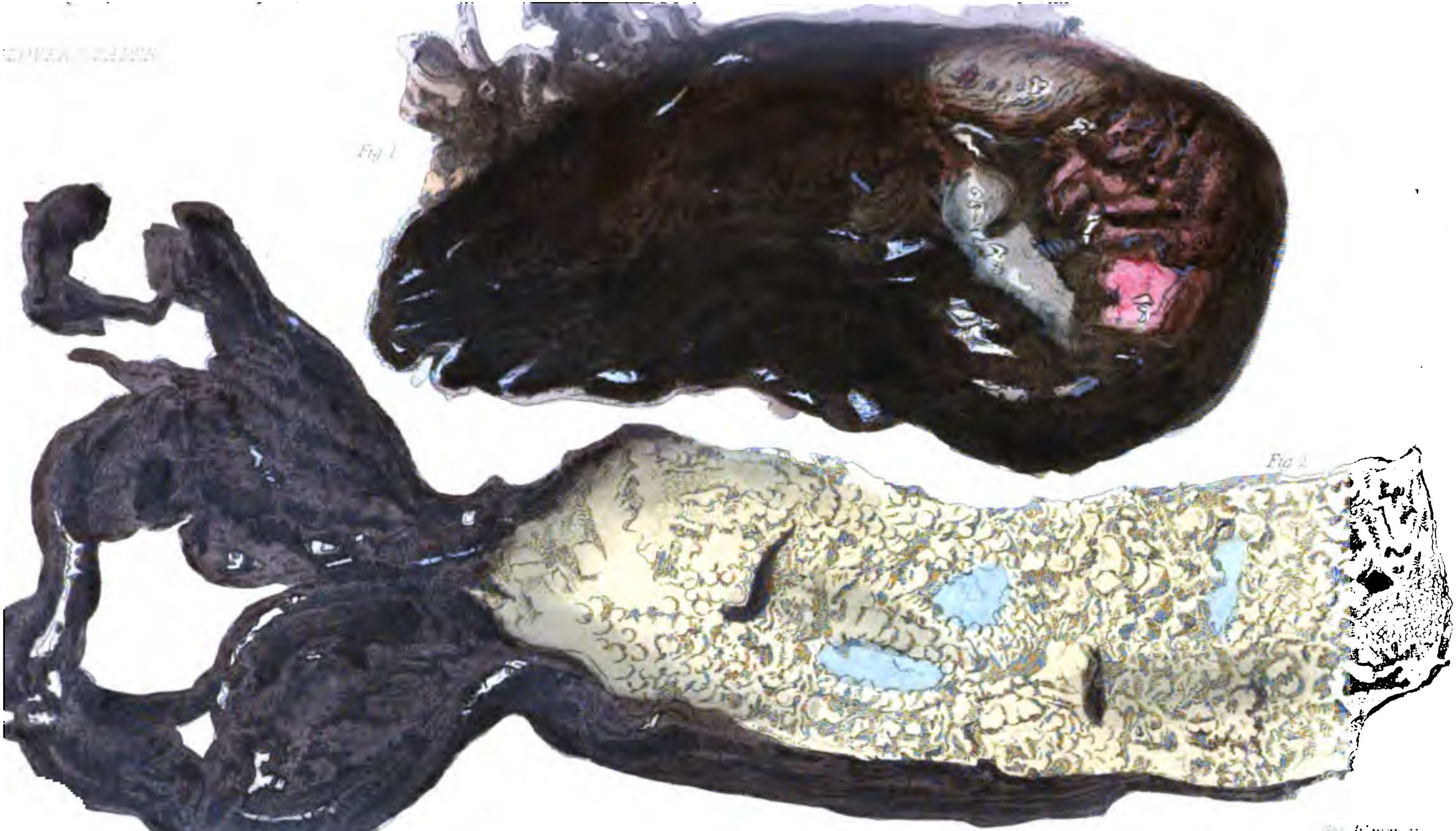
Fig 1

Fig 2

Hickman sc.

Stomach of dog destroyed by Bromide of Cyanogen, with abrasions of mucous membrane.

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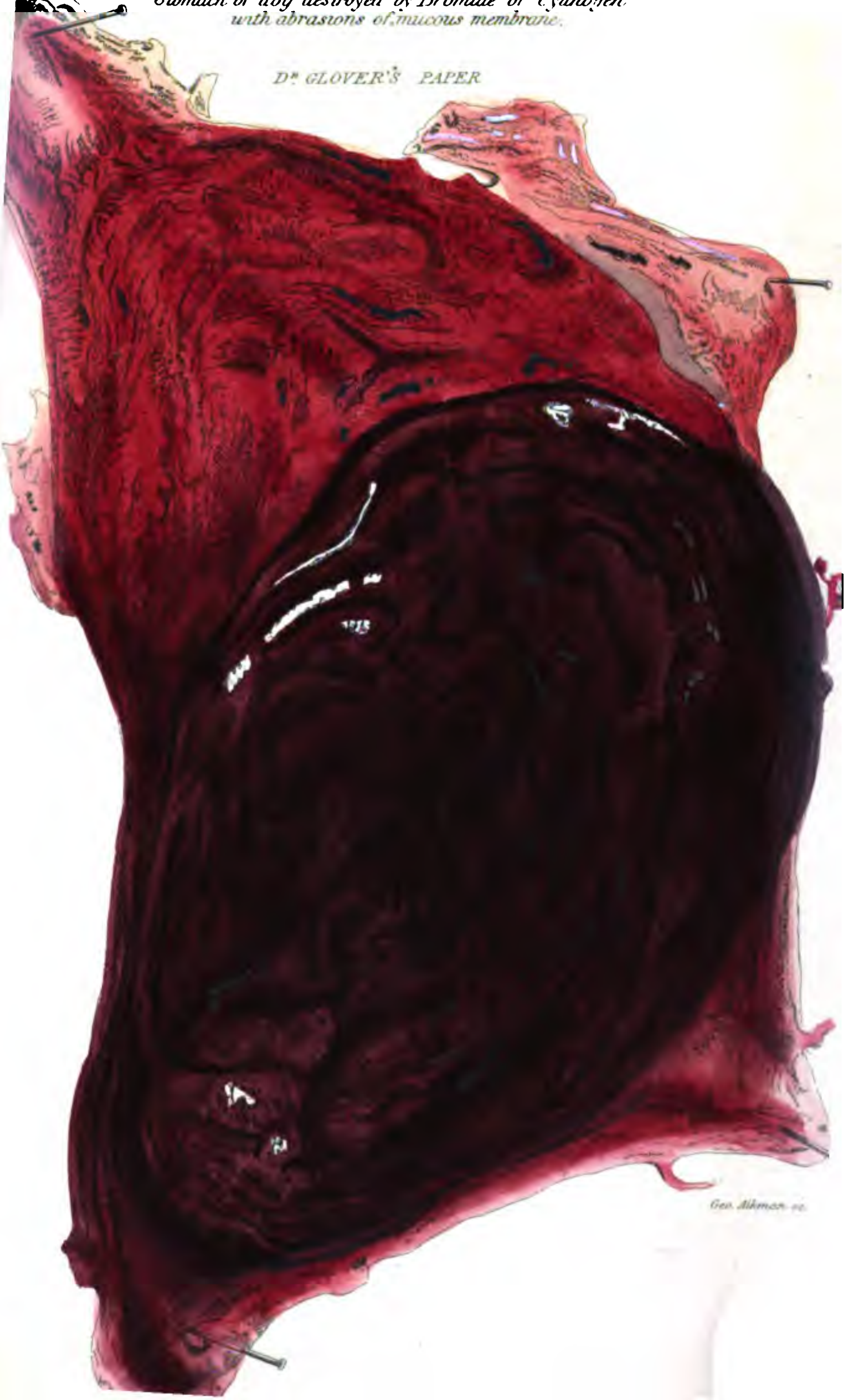

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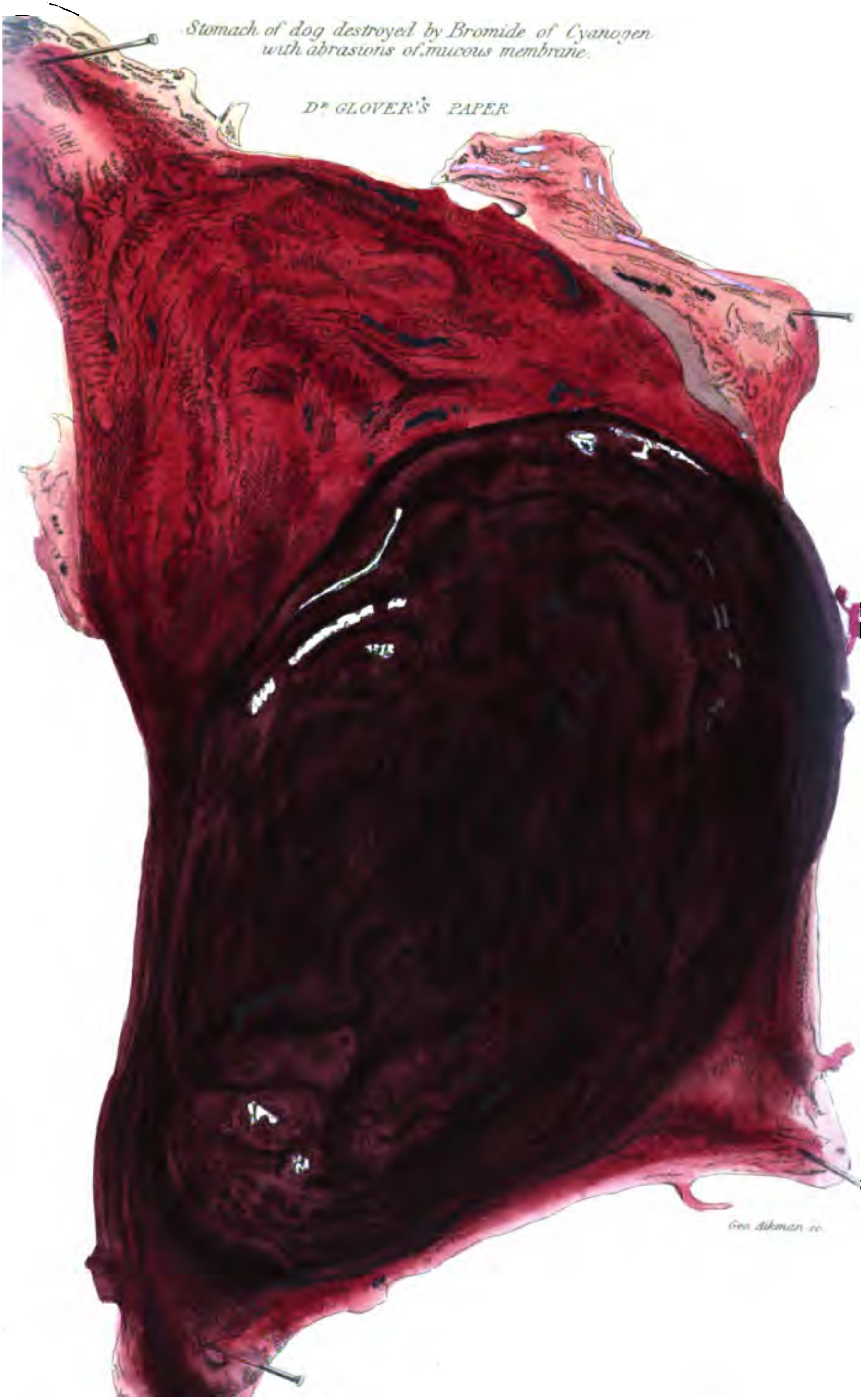

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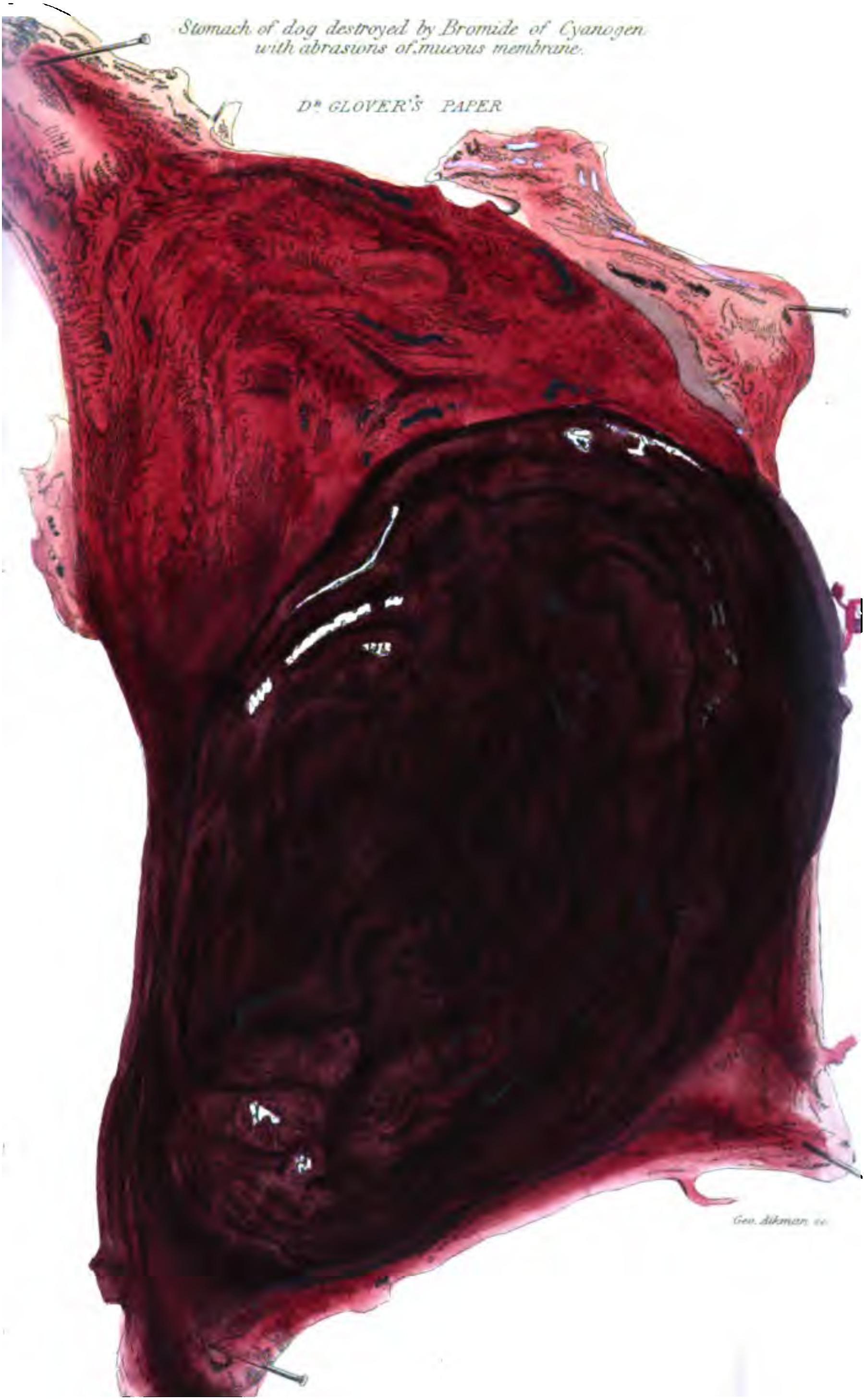

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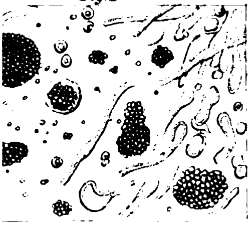
Fig. 1



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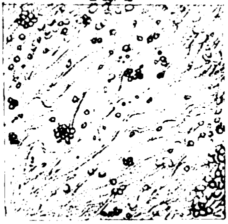

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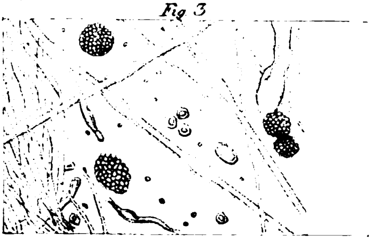

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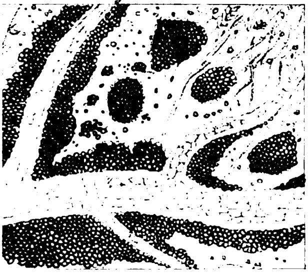

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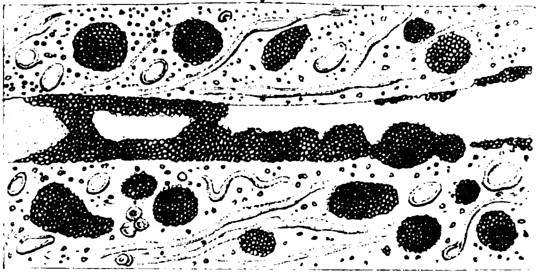

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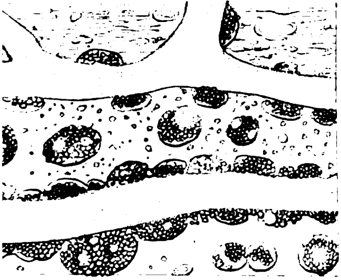

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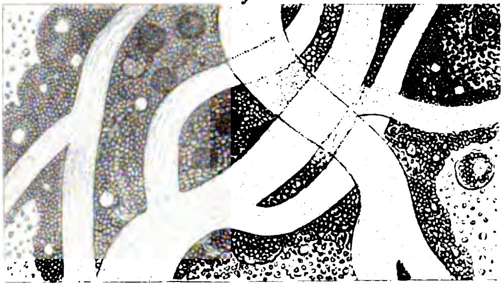

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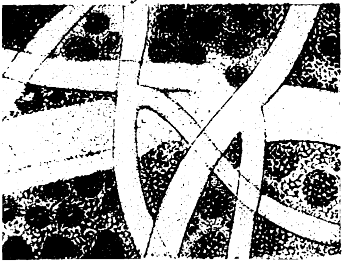

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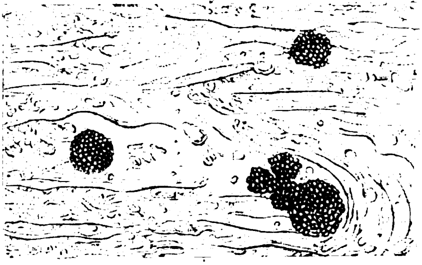

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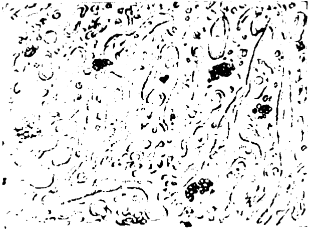

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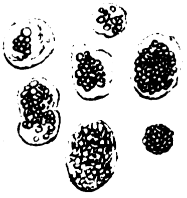

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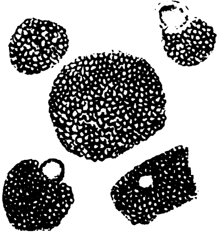

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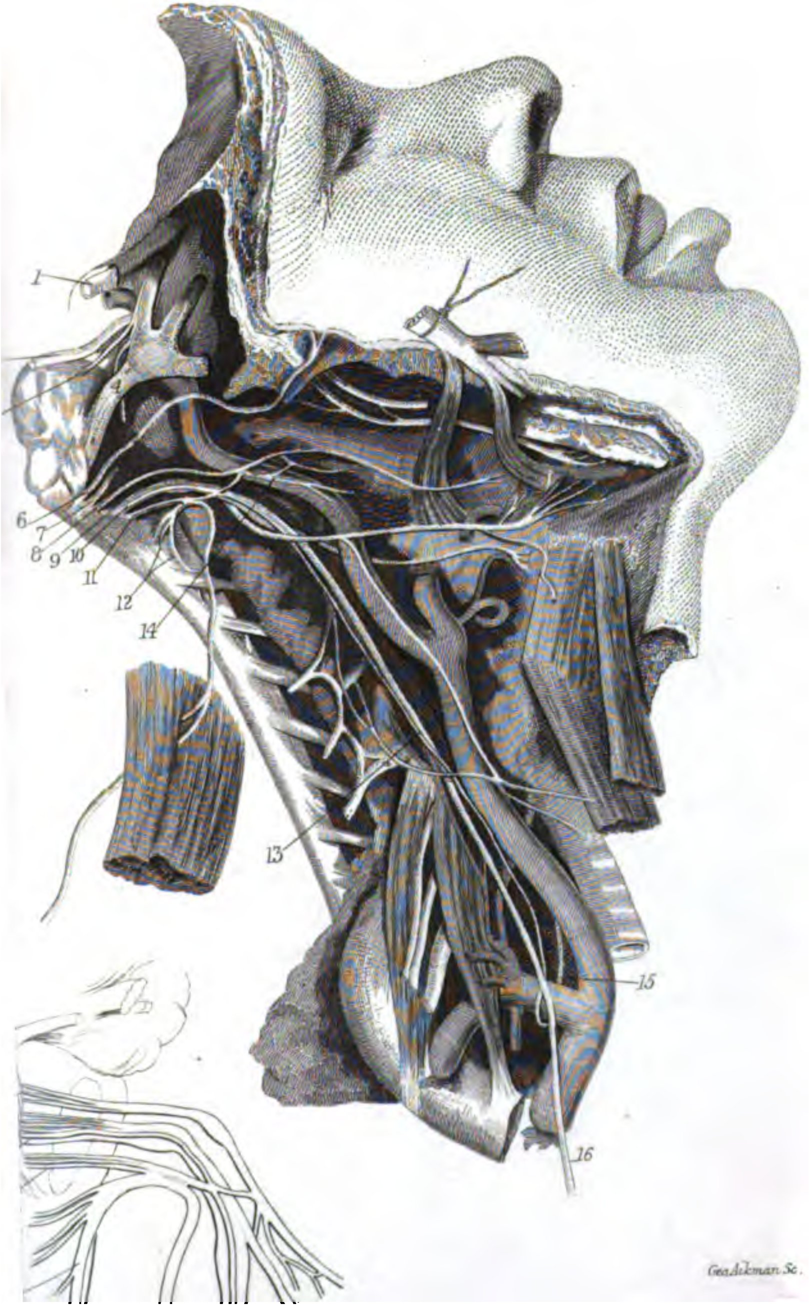

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